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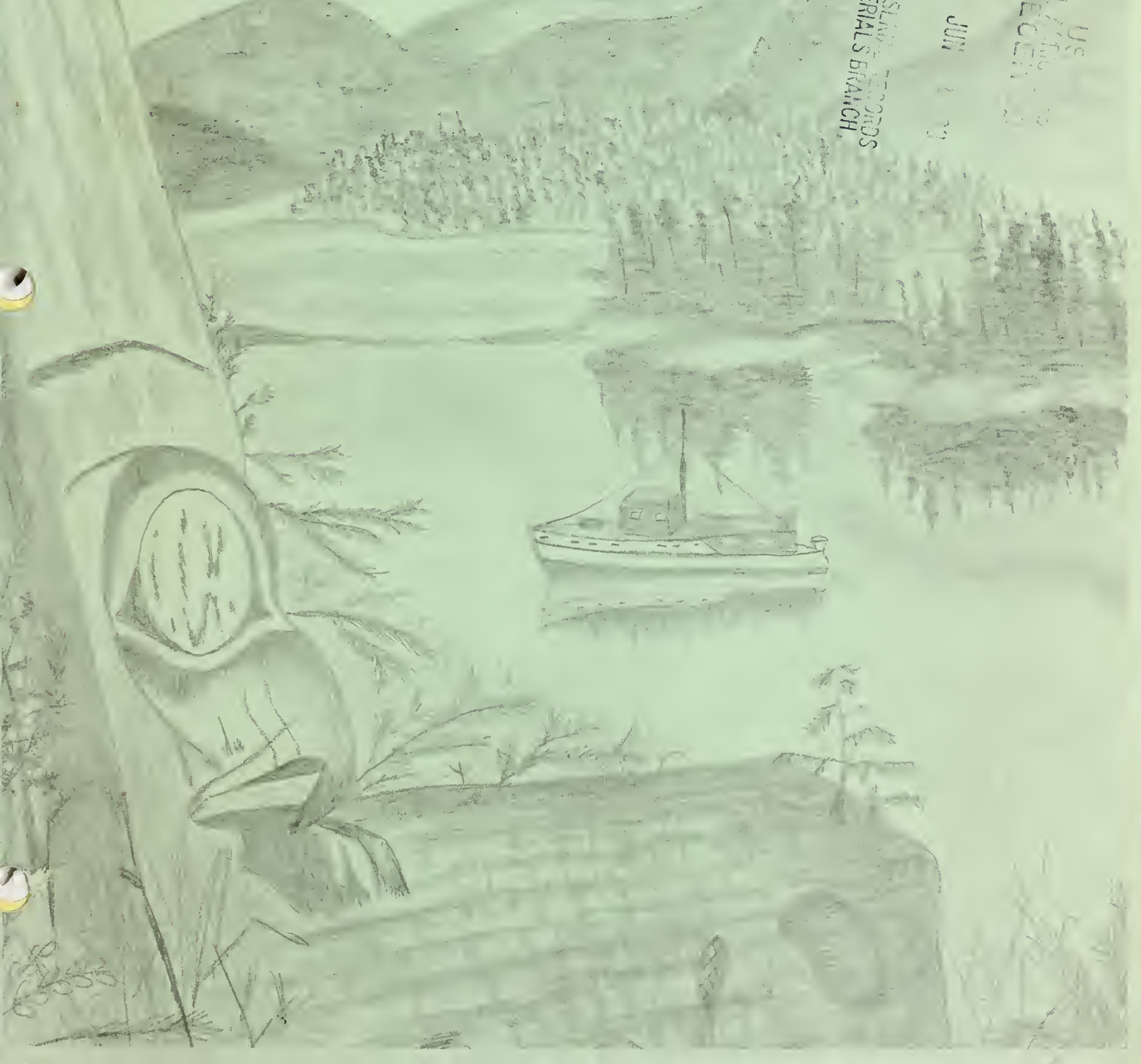
Analysis of the Management Situation

Tongass National Forest Land and Resource Management Plan Revision



Analysis of the Management Situation

Tongass National Forest Land and Resource Management Plan Revision

ANALYSIS OF THE MANAGEMENT SITUATION

FOR THE

REVISION OF THE

TONGASS LAND MANAGEMENT PLAN

Prepared
by

Tongass National Forest
Interdisciplinary Team

January 31, 1990

ABSTRACT: Forest Plans are ordinarily revised on a 10-year cycle, or when significant changes occur in either the Resources Planning Act Program or in the area covered by the Plan. Whenever a Forest Plan is revised as is occurring on the Tongass, the 10-step National Forest Management Act planning process is followed. The fourth step of this process is the Analysis of the Management Situation.

The Analysis of the Management Situation (AMS) assesses the ability of the Tongass National Forest to supply goods and services to respond to society's needs. It describes the present management situation and resource conditions, and analyzes the physical, biological, social and economic data, and the public issues. The AMS also identifies the need to change management direction in relation to the current Forest Plan.

TABLE OF CONTENTS

CHAPTER 1
INTRODUCTION

CHAPTER 1 - INTRODUCTION

PURPOSE OF THE AMS

The Analysis of the Management Situation (AMS) assesses the ability of the Tongass National Forest to supply goods and services in response to society's needs. It describes the present management situation and resource conditions, and analyzes the physical, biological, social and economic data, the public issues, and the management concerns. This information is used to identify needed changes in the current Tongass Land Management Plan, and help develop potential options for future management of the Forest.

This AMS document represents the analysis done for the Tongass Land Management Plan revision as of January 31, 1990. It is the record of this analysis at one point in time, and should not be considered the "final word" for any particular resource or issue. As planning continues, changes will naturally occur, both in the resource base, and in our knowledge of it, and any changes affecting future decisions about the Tongass will be incorporated at later stages in the analysis and documentation (such as for the Draft or Final Environmental Impact Statements). The AMS itself will not be updated as this occurs, but the planning record will always be kept up to date. Also, the AMS is an informational document, not a "decision" document. The only decision for the Forest Plan revision will come with publication of the Final Environmental Impact Statement.

RELATIONSHIP OF AMS TO TLMP

The Analysis of the Management Situation examines the current management direction in the Tongass Land Management Plan, and explores the need to establish or change management direction. The AMS provides the sideboards or basis within which a broad range of alternatives for the Tongass National Forest Land Management Plan Revision will be developed.

The National Forest System Land and Resources Management Planning regulations require that the Analysis of the Management Situation address five items:

1. The range of outputs that are feasible under existing conditions at various levels of management intensity.
2. Projections of demand.
3. Potential to resolve issues.
4. The technical, economic, and environmental feasibility of meeting assigned goals and objectives.
5. The need to establish or change management direction.

OVERVIEW OF THE PLANNING PROCESS

The major planning goal for the Tongass National Forest is to provide enough information to aid decisionmakers in determining which combination of goods, services, and land allocations will be most beneficial to the public.

Several laws and regulations are applicable to the Tongass Land and Resources Management Plan Revision. These laws include the National Environmental Policy Act of 1969 (NEPA), the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA), and, an amendment to RPA, the National Forest Management Act of 1976 (NFMA). Other laws significant to the Revision are the Alaska Statehood Act of 1959, the Alaska Native Claims Settlement Act of 1971 (ANCSA), and the Alaska National Interest Lands Conservation Act of 1980 (ANILCA).

Based on land and resource capabilities, the forest planning process determines the Forest's ability to resolve the public issues and respond to the national demands identified in the Resources Planning Act Assessment. The National Forest Management Act (NFMA) requires that Forest Plans be reviewed every five years, and ordinarily be revised on a 10-year cycle, or when significant changes occur in either the Resources Planning Act Program or in the conditions in the area covered by the Plan.

Whenever a Forest Plan is revised (as is occurring on the Tongass) the forest planning process is followed. An interdisciplinary team has been assembled and is completing the ten steps of the planning process for the Tongass Land Management Plan Revision. The 10-step planning process includes:

1. Identification of issues
2. Development of planning criteria
3. Inventory and data collection
4. Analysis of the management situation
5. Formulation of alternatives
6. Estimation of effects of alternatives
7. Evaluation of the alternatives
8. Selection of the Preferred Alternative
9. Plan implementation
10. Monitoring and evaluation of plan performance.

The Analysis of the Management Situation incorporates the first four steps of this process.

RELATIONSHIP OF TLMP TO THE REVISION

The original Tongass Land Management Plan was approved in 1979, and subsequently amended in 1985-86. The original plan, even as amended, did not reflect many of the changes that have occurred over the past decade in the process by which Forest Plans are developed and structured. In addition, public values continue to evolve, market conditions have changed, and our knowledge about forest management activities and resource interrelationships has increased. New technology has led to improved inventory accuracy, storage, and manipulation, and new mathematical modeling techniques. These are the reasons that a revision of the Tongass Land Management Plan is being considered.

ORGANIZATION OF THIS DOCUMENT

The Analysis of the Management Situation is comprised of seven parts. Chapter 1 is the introduction that you are now reading. Chapter 2 presents the public issues developed in 1988. The issues will be used to formulate alternatives, and to help define the scope of the environmental analysis required by the National Environmental Policy Act.

An assessment of the present management situation is covered in Chapter 3, "Resource Setting." This chapter discusses the existing inventory of each resource. Historical use patterns are identified and future trends explored. The necessity for changes in management direction may also become apparent in this chapter.

One of the primary purposes of a Forest Plan is to allocate the land within the Forest to different management area prescriptions. Chapter 4 of this document displays the proposed management prescriptions. Each management area prescription is a strategy for managing the resources of an area of land, and is made up of compatible management practices. These management practices are specific actions or treatments that address issues or concerns and the

requirements of law and policy. Chapter 4 describes and explains the management prescriptions.

Benchmarks are discussed in Chapter 5. By examining hypothetical management strategies, the benchmarks determine the Forest's capability to produce different resources at maximum levels, and highlight some of the trade-offs involved in such single-resource emphases. The descriptions of the benchmarks and their results are presented in this chapter.

In Chapter 6, the ability of the Forest to resolve the public issues is examined. It draws on the discussions in Chapter 3. Finally, Chapter 7 puts together the analyses from Chapters 3, 5 and 6, and draws conclusions about the need to change management direction.

There are also several appendices containing more detail about items discussed only briefly in the body of the document, or providing additional detail to support assumptions and rationale used.

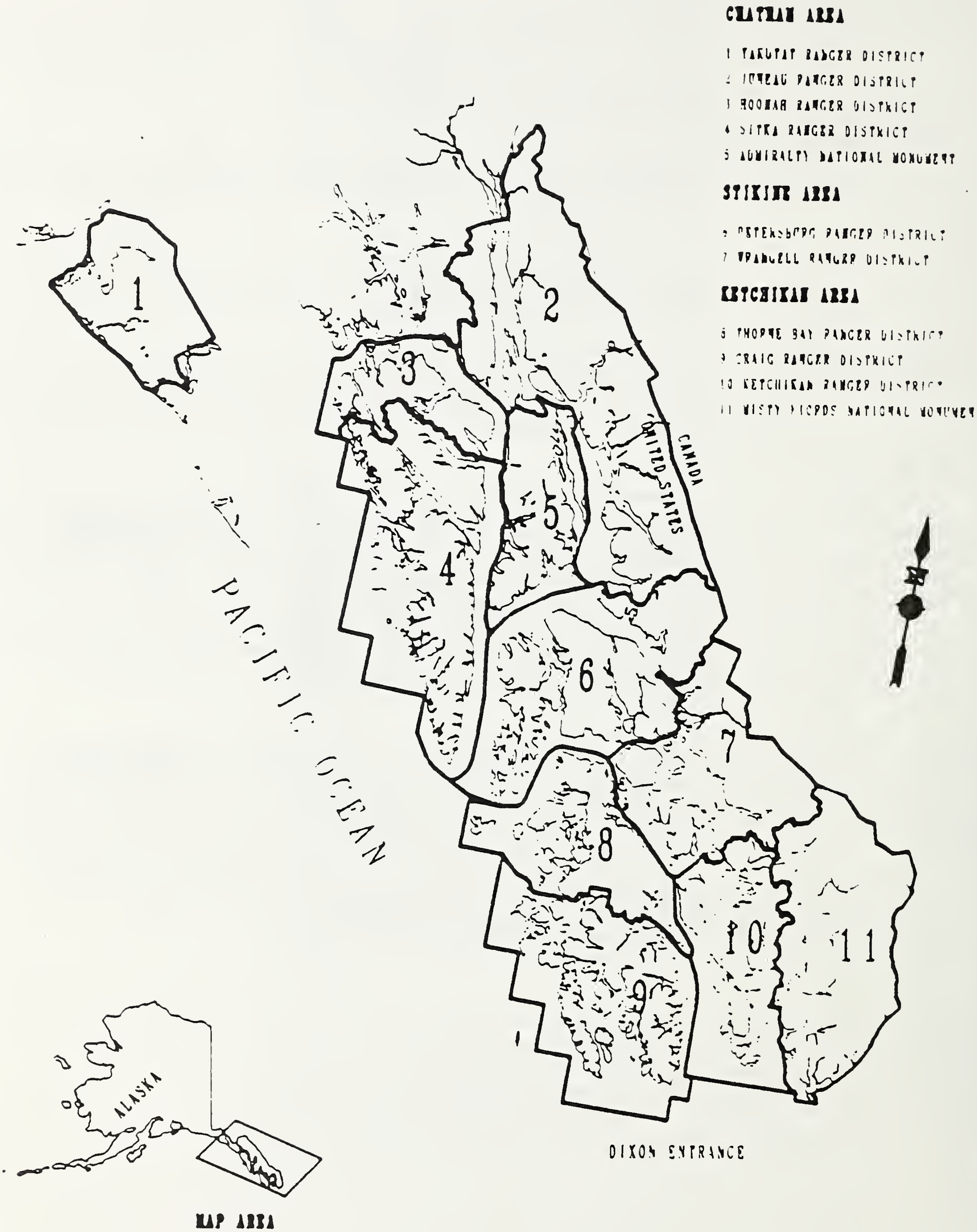
FOREST DESCRIPTION

The 16.9 million acre Tongass National Forest includes essentially all of Southeast Alaska, from Dixon Entrance in the south to Yakutat in the north, and is bordered on the east by Canada, and on the west by the Gulf of Alaska. The Tongass extends approximately 500 miles north to south, and about 120 miles east to west.

The Tongass National Forest was created in 1907 by Presidential Proclamation, assigning the Forest Service with the responsibility of managing the land. The Congress of the United States has established 14 wilderness areas in the Tongass, encompassing approximately 5.4 million acres, more than one-third of the Forest. Two of these Wilderness areas, Misty Fiords and Admiralty Island, are also designated National Monuments to further preserve their ecological, cultural, geological, historical, prehistorical, and scientific features. Other specially designated areas include two experimental forests and several research natural areas, that were established to study the response of forest ecosystems to natural and human-caused conditions.

The Tongass has three administrative areas: The Chatham Area with its Supervisor's Office at Sitka, the Stikine Area with its Supervisor's Office at Petersburg, and the Ketchikan area with its Supervisor's Office in Ketchikan. As displayed in Figure 1-1, the three administrative areas are composed of nine Ranger Districts and two National Monuments. Offices for the Ranger Districts are located in Yakutat, Juneau, Hoonah, Sitka, Petersburg, Wrangell, Thorne Bay, Craig, and Ketchikan; the offices for the National Monuments are located in Juneau and Ketchikan. For an in-depth description of the Tongass National Forest, refer to Chapter 3 of this document.

FIGURE 1-1
TONGASS NATIONAL FOREST ADMINISTRATIVE AREAS



CHAPTER 2
PUBLIC ISSUES

CHAPTER 2 - ISSUES, CONCERNS AND OPPORTUNITIES

INTRODUCTION

In the march toward new lands and opportunity, early day settlers tended to take advantage of the resources as they found them, and then moved on. As the nation became more populated, competition for resources increased. Those who first journeyed into an area took the best for themselves, leaving the rest for the latecomers. There was little planning for future growth. Rarely would anyone even consider the outcome of an event, such as damming a stream for irrigation, clearing land for farming, firewood and building homes, catching fish to feed families in a community, or washing through the gravel in a stream to get at the gold buried there. People often behaved as if the seemingly endless bounty would never run out.

Alaska is known to most of those living in "the lower 48" as "The Last Frontier." To many, Southeastern Alaska is viewed as the final example of what America was like two hundred years ago. The seemingly limitless resources, the vast isolated wilderness, and the lack of big city stress and tension, are the stuff that dreams are made of. In reality, however, many of the same stresses that are experienced in big cities are experienced in Southeast Alaska communities.

Nearly 80 percent of Alaska's panhandle is within the Tongass National Forest, an area larger than the State of West Virginia. This area stretches roughly 500 miles from Ketchikan in the southeast, to Yakutat in the northwest, and is mainly unpopulated wild country. Presently, only about 65,000 people live in over 30 towns, communities and villages located in or very near the boundaries of this huge National Forest. Population expansion in Southeast Alaska is fairly slow, but already there are concerns about where new communities should be built, how big they should be, what their economies should be based on, and what role resources of the Tongass National Forest will play in developing and enhancing communities and their economies.

The economies of most communities in Southeast Alaska depend almost exclusively on the Tongass National Forest to provide natural resources for uses such as fishing, tourism, recreation, timber harvesting, mining and subsistence uses. There is very little private land to provide these resources. Consequently, maintaining the abundant natural resources found on the Tongass concerns those who make their living here. Having learned the lessons of the past, many Southeast Alaskans want to keep that which makes their part of the world unique. At the same time, they want to continue maintaining their economic livelihood. Alaskans aren't alone in this dream of living on the Last Frontier. Slowly, more and more people are finding their way north, some communities are growing, and the pressures of civilization are increasing. Now people have an opportunity to refine or even redefine the future they want for Southeast Alaska. That is a big part of what revising the Tongass Land Management Plan is all about.

Forest plans are revised to reflect changes brought about by time: changes in public values, in market conditions, and in knowledge about forest management activities and the Forest itself. The first major step on the road toward revising the existing Tongass Land Management Plan was to find out how public values have changed, what people want from the Forest, and what they want the Tongass to look like 10 to 15 years from now. This step is called issue identification and is summarized below.

IDENTIFYING ISSUES

In late 1987, over 4,000 copies of preliminary issues defined by the Forest Service were distributed to those expressing an interest in management of the Tongass. The preliminary issues were developed after reviewing what people had said during previous planning efforts. Also, over 22,000 homes and businesses received the preliminary issues as an insert in seven Southeastern newspapers. Following distribution of these issues, workshops were held in 33 Southeast Alaska communities to review and discuss the revision process and the proposed issues. To get as many people involved as possible, news releases were aired on radio and television and notices were posted throughout communities and published in local newspapers.

Early in 1988, over 600 letters arrived at the forest planning office, with comments on the original list of issues. These letters were from individuals, business people, representatives of special interest groups, and officials holding positions in either State or community governments. The great majority of responses came from individuals and organizations within Southeast Alaska (Table 2-1). A wide spectrum of viewpoints representing every level of interest was received. Each letter was read, and comments were coded by subject, then entered into a computerized database. As specific responses were reviewed, it became clear that the public was most concerned with two major types of issues: 1) land allocation issues and 2) community lifestyles, stability and jobs issues.

TABLE 2-1
NUMBER OF INDIVIDUAL RESPONDENTS BY COMMUNITY

Community		Number of Respondents	Community		Number of Respondents
Angoon		4	Klawock		3
Auke Bay		2	Meyers Chuck		5
Coffman Cove		10	Pelican		43
Craig		6	Petersburg		52
Douglas		8	Point Baker		6
Elfin Cove		4	Port Alexander		2
Edna Bay		5	Rowan Bay		1
Gustavus		30	Sitka		67
Haines		15	Skagway		2
Hobart Bay		1	Tenakee Springs		5
Hollis		1	Thorne Bay		4
Hoonah		122	Tokeen		1
Hydaburg		2	Ward Cove		1
Hyder		2	Wrangell		26
Juneau		52	Yakutat		4
Kasaan		1	Other Alaska		13
Ketchikan		84	Lower 48		38
	Subtotal	346		Subtotal	276
		Total	622		

Source: Forest Plan Revision Planning Records.

RELATIONSHIP OF IDENTIFIED ISSUES TO THE TONGASS LAND MANAGEMENT PLAN

In the 1979 Tongass Land Management Plan, eight issues were identified and addressed: land allocation, community lifestyles, community stability and jobs, wilderness preservation, Admiralty Island, fish and wildlife, aquaculture, and minerals. With the exception of Admiralty Island and aquaculture, issues identified in 1979 continue today. Of particular concern now, as then, are the amount and location of land allocated to scenic and recreation values, fish and wildlife habitat, timber harvesting, mineral exploration and development, and wilderness. In addition, there continues to be concern about maintaining lifestyles, community stability, and jobs.

DISCUSSION OF SELECTED ISSUES

The major issues are presented below in the form of questions. An overview of each issue is presented, followed by a description of the interrelationship of the issue with other resource issues and by indicators of responsiveness to the issues. The degree to which issues can be resolved is limited by the fact that managing for some uses does not always complement other uses. There is not likely to be one management approach that is fully responsive to all issues.

ISSUE

WHAT AREAS ON THE TONGASS NATIONAL FOREST SHOULD BE MANAGED TO EMPHASIZE SCENIC RESOURCES?

Overview

The Tongass National Forest is a unique combination of land and marine environments. The Forest includes a narrow mainland strip and over one thousand offshore islands. Together the islands and mainland provide nearly 13,000 miles of meandering shoreline, interspersed with numerous bays. The mainland and islands are mountainous, often abruptly rising from sea level to elevations of 3,000 feet and more. Beyond the mountains on the mainland, huge ice fields produce glaciers easily viewed from the waterways. World-class scenery, resulting from the unique interaction of mountain and ocean environments, draws thousands of visitors each year. These visitors view Southeast Alaska from cruiseships or ferries traveling the popular Inside Passage water route. Tourism has become a major industry in Southeast Alaska, similar to timber harvest and commercial fishing in terms of the number of people directly employed. Tourism has helped diversify economies of some communities. Maintaining the scenic quality of the Forest landscape is of concern to Forest visitors, individuals, groups, businesses, and communities.

The majority of individual respondents from several Southeast Alaska communities want to see more emphasis placed on managing for scenic resources. These communities include: Angoon, Auke Bay, Craig, Douglas, Edna Bay, Gustavus, Haines, Juneau, Klawock, Pelican, Petersburg, Point Baker, Sitka, Tenakee Springs, Thorne Bay, and Wrangell. The majority of respondents from the Lower 48 also want more emphasis placed on managing for scenic resources. Several cities and organizations expressed similar interest in managing the Tongass to emphasize natural scenic quality. These include: Alaska Discovery, City and Borough of Sitka, City of Tenakee Springs, City of Yakutat, Hollis Community Council, Inc., Juneau Area State Parks/Advisory Board, Juneau Audubon Society, Narrows Conservation Coalition, Sierra Club, Southeast Alaska Conservation Council, and Yakutat Fishermen's Association.

Individuals and organizational representatives want scenic screens along Alaska Marine Highway routes, roads, and streams; and around their communities. They stress maintaining scenic quality in these areas because of the importance of tourism, recreation and aesthetics. They are concerned that timber harvesting,

roads and log transfer facilities will have a negative impact on tourism, recreation, and aesthetics associated with natural scenic quality.

The majority of respondents living in communities more dependent on timber harvesting, including Ketchikan, Craig, Hobart Bay, Hoonah and Wrangell, want to continue to be able to harvest timber along Alaska Marine Highway routes, roads, and streams; and around their communities. The Ketchikan Chamber of Commerce and the City of Wrangell recommend that some of the areas be cut progressively at a moderate rate rather than heavily at a rapid rate to maintain scenic quality and to display a multiple-use forest. They are concerned that allocating land along ferry routes to maintain natural scenic quality will cause reductions in the annual timber harvest.

Individual respondents from Coffman Cove and Skagway and from organizations including Alaska Loggers Association, Inc., and Snow Mountain Pine Company suggest that the Forest be managed for both scenic quality and timber harvesting.

Opinion regarding management for scenic quality was split in the communities of Sitka and Wrangell with half of the respondents wanting more emphasis on scenic quality; half wanting the Forest to be managed for both scenic quality and timber harvesting. Respondents from Thorne Bay were split with half wanting more emphasis on scenic quality; half wanting less emphasis. Half of Hobart Bay respondents want present emphasis on scenic quality to continue, while half want less. Respondents from Hoonah were split three ways in their opinion of emphasizing scenic quality with some wanting more, others wanting less, and still others wanting current scenic quality to be maintained.

Interrelationship with Other Major Issues

Recreation. World-class scenery on the Tongass National Forest is a major recreation attraction. Each year many thousands of sightseers travel the "inside passage" of Southeast Alaska by cruiseship or ferry. Hiking, boating, hunting and fishing are enhanced by pleasant visual experiences. Little or no conflict between managing for scenic resources and recreation exists.

Fish and Wildlife Habitat and Subsistence. Maintaining a variety of scenic landscapes could provide a diversity of habitats needed for maintaining important sport, commercial, and subsistence fish and wildlife species. There is little or no conflict between these issues and scenic resources.

Wilderness. Managing for natural scenic quality would contribute to the pristine characteristics found in Wilderness. There is little or no conflict between scenic resources and Wilderness.

Timber Harvesting, Transportation and Mineral Development. Maintaining scenic resources can result in a reduction of available timber supply and can affect the location of log transfer facilities and roads. Emphasizing scenic resources next to existing mining areas or areas of high mineral potential can create future resource conflicts.

Local Lifestyles. For those employed by the timber and mining industries, emphasizing scenic resources could result in a reduction of jobs since the timber supply may be reduced and the cost of access for timber and mining may increase. There is little or no conflict between scenic resources and communities dependent on commercial fishing, tourism, recreation and subsistence.

Indicators of Responsiveness

Table 2-2 shows how responsiveness of alternatives to this issue may be measured.

TABLE 2-2
OUTPUTS OR EFFECTS MEASURED TO DETERMINE RESPONSIVENESS OF ALTERNATIVES TO THE SCENIC RESOURCES ISSUE

Output or Effects to be Measured	Unit of Measure (1000's of Acres)
Visual quality objectives in seen areas:	
Retention	M acres
Partial Retention	M acres
Modification	M acres
Maximum Modification	M acres
Visual quality objectives in unseen areas:	
Retention	M acres
Partial Retention	M acres
Modification	M acres
Maximum Modification	M acres
Effects to proposed Scenic Byways:	
Retention	M acres
Partial Retention	M acres
Modification	M acres
Maximum Modification	M acres

Source: Forest Plan Revision Interdisciplinary Team

ISSUE

WHAT AREAS SHOULD BE MANAGED TO EMPHASIZE RECREATION OPPORTUNITIES?

Overview

Dense spruce and hemlock rain forests, active glaciers, salmon, whales, eagles, bears, and miles of protected waterway, combined with the vast size and remote character of the Forest, provide a truly unique natural setting. For the most part, roads and trails are few and are concentrated around communities. Outdoor recreation opportunities offered by the Tongass National Forest play an important role in the quality of life for the majority of Southeast Alaska residents. Many families have favorite places where they fish, hunt, beachcomb, hike, or just go to get away. Visitors and residents alike recognize the unique recreation experience afforded by lack of roads and necessity for boat access.

The majority of individuals responding from Angoon, Auke Bay, Craig, Douglas, Gustavus, Juneau, Klawock, Pelican, Petersburg, Point Baker, Skagway, Tenakee Springs, Thorne Bay, and Wrangell want to see more emphasis placed on managing for recreation. Likewise, the majority of respondents from the Lower 48 want additional emphasis placed on managing for recreation. Cities and organizations wanting more emphasis placed on managing for recreation include: Alaska Discovery, City of Tenakee Springs, City of Yakutat, Haida Corporation, Hollis Community Council, Inc., Hyder Community Assoc., Inc., Island Riders Association, Juneau Area State Parks/Advisory Board, Juneau Audubon Society, Ketchikan Area State Pards Advisory Board, Northwest Rivers Council, Sierra Club, Sitka Advisory

Committee, Sitka State Parks Advisory Board, Southeast Alaska Conservation Council, State Parks and Outdoor Recreation and the Wildlife Society.

These individuals and organizations are concerned about what might happen to recreation places as a result of other resource management activities. Many point out that timber harvesting, roading, and other by-products of logging, and mineral exploration and development, can result in unwelcome changes in scenery, solitude and traffic patterns. These groups emphasize the need for undeveloped recreation areas, additional trails, and cabins.

Hyder Community Association Inc., Ketchikan State Parks Advisory Board, Western Forests Industries Association, and Hull Cutting Company indicate that additional road access to recreation areas is important. They point out that roads built for logging are used extensively by recreationists. That being the case, the timber industry wants recreation to share road costs. Rather than undeveloped recreation areas, some communities, including Ketchikan and Wrangell, emphasize the need for developed sites to provide recreation for the many campers that travel by ferry.

The Alaska State Society of American Foresters, City of Wrangell - Economic Development Director and the FMC Gold Company want a mix of management emphasis placed on recreation and other Forest uses including timber harvesting and mining. Yakutat Fisherman's Association wants current management emphasis on recreation to continue.

Opinion was split between individual respondents in the communities of Coffman Cove, Edna Bay, Haines, and Hoonah. About half want more emphasis on recreation, and half are satisfied with the current mix of emphases. Likewise, respondents from Hobart Bay were split. About half want more emphasis on recreation, while half want less. The majority of respondents from Sitka requested that less emphasis be placed on managing for recreation, while Ketchikan respondents are satisfied with the current management emphasis.

Interrelationship with Other Major Issues

Scenic Resources. Generally, there is little or no conflict between recreation and scenic resources.

Fish and Wildlife Habitat and Subsistence. Little change in the overall habitat is likely from recreation activities, although fish and wildlife populations could be affected by sport hunting and fishing which affect subsistence opportunities. Conflicts between humans and bears may increase.

Wilderness. Managing for primitive recreation opportunities will have little or no conflict with potential Wilderness. However, managing for roaded recreation may remove primitive characteristics associated with potential Wilderness.

Timber Harvesting, Transportation and Mineral Development. Managing to provide recreation opportunities can reduce the available timber supply and can affect the location of log transfer facilities and roads. While timber harvesting and mineral development can occur in conjunction with motorized recreation, the noise and traffic associated with these activities is unpleasant to some recreationists. The potential for increased road use for recreation will remain limited to a relatively small number of local residents and ferry passengers, as Southeast Alaska is not connected internally or with the Lower 48 by road.

Local Lifestyles. If emphasis is on primitive and semi-primitive non-roaded recreation, a reduction of jobs for those employed by the timber and mining industries could result. There is little or no conflict between recreation and communities dependent on commercial fishing, tourism, recreation, and subsistence.

Indicators of Responsiveness

Responsiveness of alternatives to this issue may be evaluated by measuring outputs or effects presented in Table 2-3.

TABLE 2-3
OUTPUTS OR EFFECTS MEASURED TO DETERMINE RESPONSIVENESS OF ALTERNATIVES TO THE RECREATION RESOURCES ISSUE

Output or Effects to be Measured	Unit of Measure
Developed recreation use or capacity	MRVD's
Developed site construction	units
Developed site reconstruction	units
Nonwilderness dispersed recreation use or capacity:	
Semi-primitive non-motorized	MRVD's
Semi-primitive motorized	MRVD's
Roaded natural	MRVD's
Roaded modified	MRVD's
Wilderness recreation	MRVD's
Trial construction	miles
Trail reconstruction	miles
Trail maintenance	miles
Cabins	units

Source: Forest Plan Revision Interdisciplinary Team

ISSUE

WHAT METHODS SHOULD BE USED TO PROTECT RESIDENT AND ANADROMOUS FISH HABITAT?

Overview

The fisheries resource on the Tongass contributes significantly to the economic, recreational, and subsistence needs of residents and non-residents alike. Most of the salmon caught in the waters of Southeast Alaska and in the Gulf of Alaska, originate in streams and lakes lying within the boundaries of the Tongass National Forest. Streamside habitat provides important shelter, hiding places, food, and rearing areas for Alaska's salmon. Changes in streamside habitat can alter a stream's ability to produce fish.

Fish resources have a large economic impact throughout Southeast. The majority of respondents from Angoon, Craig, Douglas, Edna Bay, Gustavus, Haines, Hoonah, Juneau, Ketchikan, Pelican, Petersburg, Point Baker, Port Alexander, Tenakee Springs, Thorne Bay, and Wrangell believe the value of these fisheries is greater than the value of timber production. They believe fish habitat should always be given preference over timber harvest and related activities. They recommend that streamside zones be established to protect resident and anadromous fish streams and riparian areas. Those responding from the Lower 48 want additional emphasis put on managing the Forest for fish. Cities and organizations holding similar views include: City and Borough of Sitka, City of Port Alexander, City of Tenakee Springs, City of Yakutat, Friends of Berners Bay, Haida Corporation,

Hollis Community Council, Inc., Hyder Community Assoc. Inc., Juneau Audubon Society, Narrows Conservation Coalition, Sitka Advisory Committee, Southeast Alaska Conservation Council, State of Alaska - Office of the Governor, Sumner Strait Fish and Game Advisory Committee, USDI Fish and Wildlife Service, Wildlife Society, and Yakutat Fish and Game Advisory Committee.

Coffman Cove, Hobart Bay, and Hydaburg respondents believe the current mix of management for fish and timber harvesting is sufficient, as does the City of Wrangell - Economic Development Director, and Hull Cutting Co. Organizations requesting a mix of management on fish and other Forest resources include: Alaska Loggers Association, Inc., Alaska State Senate, Alaska State Society of American Foresters, FMC Gold Company, Koncor Forest Products Co., and Western Forest Industries Association.

Timber interests, including Whitestone Logging, and Snow Mountain Pine Company, point out that there is little scientific evidence supporting the benefit of streamside zones to fish habitat. They believe that streamside zones are extremely susceptible to blowdown. They also point out that as timber harvesting has continued, salmon harvests have been rising dramatically in the last ten years.

Those responding from Sitka and Skagway are split with about half wanting more emphasis on fish and half wanting the same management emphases mix.

Interrelationship with Other Major Issues

Scenic Resources. Habitat is generally unmodified when managing for fish. Fish enhancement projects could conflict with scenic resource needs and objectives. Streamside zones surrounded by clearcut timber harvesting can conflict with scenic resources.

Recreation. Managing to provide fish habitat will generally enhance recreation opportunities, since one major component of recreation is related to fishing. There is little or no conflict between fish habitat and recreation opportunities.

Wildlife Habitat and Subsistence. Managing to provide fish habitat will generally enhance wildlife habitat and subsistence opportunities. There is little or no conflict between fish habitat, wildlife habitat, and subsistence.

Wilderness. While fish enhancement projects could temporarily disturb solitude characteristics associated with existing and potential Wilderness, there is generally little conflict between fish habitat and Wilderness.

Timber Harvesting, Transportation, and Mineral Development. Managing to provide fish habitat can reduce the available timber supply, can affect the location of roads, and can result in increased roading and mineral development costs.

Local Lifestyles. Emphasis on fish habitat may affect jobs for those employed by the timber and mining industries since the timber supply can be reduced and the cost of access for timber and mining can increase. There is little or no conflict between fish habitat and communities dependent on commercial fishing, tourism, recreation, and subsistence.

Indicators of Responsiveness

Responsiveness of alternatives to this issue may be evaluated by measuring the outputs or effects displayed in Table 2-4.

TABLE 2-4
OUTPUTS OR EFFECTS MEASURED TO DETERMINE RESPONSIVENESS OF ALTERNATIVES TO THE ANADROMOUS FISH HABITAT ISSUE

Output or Effects to be Measured	Unit of Measure
Riparian Areas (non-wilderness)	
Full Protection (no harvest)	acres
Moderate Protection RX-15	acres
Minimum Protection RX-14	acres
Estuarine habitat affected	acres
Anadromous commercial fish catch/harvest potential	M Lbs
Sport fish (potential)	
Anadromous	WFUD's
Resident	WFUD's
Management Indicator Species	smolt habitat capability,
Coho Salmon	M of fish
Pink Salmon	
Dolly Varden Char	
Habitat improvement	
Non-wilderness	acres
Wilderness	acres
Structural habitat improvement	
Non-wilderness	units
Wilderness	units

Source: Forest Plan Revision Interdisciplinary Team

ISSUE

WHAT AMOUNT OF OLD-GROWTH AND UNDEVELOPED HABITAT SHOULD BE MANAGED FOR THE PROTECTION OF WILDLIFE?

Overview

The Tongass National Forest supports a wide variety of wildlife species, including the largest populations of brown bears and breeding bald eagles in the world. The Tongass is also somewhat unique with the abundance of marine mammals and seabird colonies. Many species, which are endangered elsewhere in the United States, are abundant on the Tongass. Alaskans and visitors find sport and subsistence hunting of moose, brown and black bears, mountain goat, and deer. Many species of furbearers, waterfowl, upland game birds, and small game also provide the public with sport, commercial, and subsistence use opportunities. Demand is also growing for opportunities to watch and photograph wildlife.

Many wildlife species abound on the Forest, using its old-growth forests for food and cover. The majority of respondents from a number of communities including, Angoon, Craig, Douglas, Edna Bay, Gustavus, Haines, Hoonah, Juneau, Ketchikan, Klawock, Pelican, Petersburg, Point Baker, Port Alexander, Tenakee Springs, Thorne Bay, and Wrangell are concerned that logging, and other development of natural resources in these old-growth stands, has a detrimental effect on the

habitat available for wildlife species. This, in turn, decreases the availability of these resources for human use. Individuals from these communities recommend that old-growth habitat, especially that near communities, be allocated to protect sport, commercial, and subsistence wildlife uses. The majority of respondents from the Lower 48 also want old growth managed for wildlife rather than for timber harvesting.

In addition to individuals, a number of cities and organizations want management to emphasize wildlife. These include: City and Borough of Sitka, City of Port Alexander, City of Tenakee Springs, City of Yakutat, Friends of Berners Bay, Hyder Community Assoc., Inc., Juneau Audubon Society, Narrows Conservation Coalition, National Marine Fisheries Service, National Wildlife Federation, Sierra Club, Southeast Alaska Conservation Council, State of Alaska - Office of the Governor, Sumner Strait Fish and Game Advisory Committee, USDI - Fish and Wildlife Service, Wildlife Society - Alaska Chapter, Yakutat Fish and Game Advisory Committee and Yakutat Fishermen's Association.

Respondents from Coffman Cove, Hobart Bay, Hydaburg, and Sitka think that current management emphasizing wildlife and timber harvesting is adequate. Organizations with similar views include: Alaska Loggers Association, Inc., Alaska State Senate, Alaska State Society of American Foresters, Koncor Forest Products, Hull Cutting Co., and Ketchikan Chamber of Commerce They believe that well-managed logging projects provide human access to wildlife and can improve wildlife habitat. They are concerned that allocating old-growth areas to protect wildlife will result in reductions in the annual timber harvest.

Respondents from Skagway were split in their opinions. Half want more emphasis on managing for wildlife while half prefer a mix of emphases.

Interrelationship with Other Major Issues

Scenic Resources. Managing for wildlife by maintaining old growth will have little or no effect on scenic quality. Managing for wildlife by creating openings, depending on the size of those openings, may be in conflict with scenic resource objectives.

Recreation. Managing to provide old-growth habitat will generally enhance primitive recreation opportunities since a major component of recreation is related to enjoyment of wildlife. Many outdoor recreation trips include wildlife photography, viewing, and hunting.

Fish Habitat and Subsistence. Managing to provide old-growth habitat will generally enhance fish habitat and subsistence opportunities.

Wilderness. Maintaining old-growth habitat will generally result in maintaining primitive characteristics associated with potential Wilderness. There is little or no conflict between this issue and Wilderness.

Timber Harvesting, Transportation, and Mineral Development. Maintaining old-growth for wildlife habitat could reduce the available timber supply, conflict with mineral development and may preclude road construction.

Local Lifestyles. Emphasizing wildlife habitat can result in a reduction of jobs for those employed by the timber and mining industries, since the timber supply can be reduced, and the cost of access for timber and mining could increase. There is little or no conflict between wildlife habitat and communities dependent on commercial fishing, tourism, recreation, and subsistence.

Indicators of Responsiveness

Table 2-5 displays the outputs or effects that may be measured to determine responsiveness of alternatives to the wildlife habitat issue.

TABLE 2-5
OUTPUTS OR EFFECTS MEASURED TO DETERMINE RESPONSIVENESS OF ALTERNATIVES TO THE WILDLIFE HABITAT ISSUE

Output or Effects to be Measured	Unit of Measure
Deer	WFUD's
Bear	WFUD's
Moose	WFUD's
Mountain Goat	WFUD's
Waterfowl	WFUD's
Other wildlife use	WFUD's
Bald eagle habitat	acres, number of protected sites
Suitable MIS habitat	acres by type, population numbers, distribution
Old growth	acres by type, distribution
Riparian	acres by prescription
Habitat improvement acres	by type of improvement
Habitat improvement structures	by type of improvement
Animal species diversity	index

Source: Forest Plan Revision Interdisciplinary Team

ISSUE

WHAT SHOULD THE FOREST SERVICE DO TO CONTINUE PROVIDING SUBSISTENCE OPPORTUNITIES?

Overview

For some people, subsistence is hunting, fishing, trapping and gathering natural resources to provide needed food which is supplemental to their income. For others, especially Southeast Alaska's Native Americans, subsistence is much more than collecting food: it is a lifestyle that preserves cultural customs and traditions, reflecting deeply-held attitudes, values, and beliefs. Because both commercial fishing and timber harvesting employment opportunities are seasonal and cyclical, subsistence use of resources is important to many Southeast Alaskans.

Individual respondents from Angoon, Douglas, Edna Bay, Gustavus, Haines, Juneau, Pelican, Point Baker, Port Alexander, and Tenakee Springs want management for subsistence to be emphasized. Cities and organizations sharing this viewpoint include: City of Port Alexander, City of Tenakee Springs, City of Yakutat, Haida Corporation, Hoonah City Council, Klawock Cooperative Association, Narrows Conservation Coalition, Sitka Advisory Committee, Sumner Strait Fish and Game Advisory Committee, and Yakutat Fish and Game Advisory Committee. These groups are concerned that timber harvesting and its associated development activities adversely affect habitat critical to important fish, wildlife, and other subsistence resources. The most-mentioned concern was that road use by non-local people results in competition with rural residents for Forest resources. The

result could be a decline in numbers of local subsistence species and more restrictive hunting regulations. To maintain subsistence opportunities, these organizations and individuals recommend that old-growth habitat be retained around communities.

Other individual respondents from Coffman Cove, Hobart Bay, Ketchikan, and Thorne Bay and organizations including: Hollis Community Council, Inc., Ketchikan Chamber of Commerce, Koncor Forest Products Co., and Yakutat Fishermen's Association think that current management emphasis on subsistence is adequate. Some believe that timber harvest and road construction have a positive effect on subsistence opportunities. They think that deer and bear make considerable use of clearcuts, that opening up the forest provides additional sources of food for subsistence species, and that roads increase hunter access to these species. They do not think that maintaining old growth around communities is necessary to ensure subsistence opportunities.

Half of those responding from Craig and Petersburg want more emphasis on subsistence while half want less emphasis. Respondents from both Sitka and Wrangell are split three ways in their opinion about how to manage for subsistence. Some want more emphasis, some want less, and a third group is satisfied with existing management.

Interrelationship with Other Major Issues

Scenic Resources. Managing for subsistence opportunities will generally maintain the scenic character of the Forest.

Recreation. Maintaining old growth for subsistence will provide for primitive and semi-primitive recreation experiences. Opportunities for sport hunting, fishing or gathering could conflict with subsistence opportunities.

Fish and Wildlife Habitat. Managing to provide subsistence opportunities will generally enhance fish and wildlife habitat. There is little or no conflict between subsistence, and fish and wildlife habitat, unless roads are constructed.

Wilderness. Managing for subsistence will generally result in little or no conflict with Wilderness, unless roaded access is desired.

Timber Harvesting, Transportation, and Mineral Development. Maintaining old growth for subsistence opportunities can result in a reduction of available timber supply and can affect the location of log transfer facilities and roads. Emphasizing subsistence opportunities next to existing mining areas or areas of high mineral potential can result in future resource conflicts.

Local Lifestyles. Emphasizing subsistence could result in a reduction of jobs for those employed by the timber and mining industries, since the timber supply could be reduced, and the cost of access for timber and mining may increase. There is little or no conflict between subsistence and communities dependent on commercial fishing, tourism, recreation and subsistence.

Indicators of Responsiveness

Responsiveness of alternatives to this issue may be evaluated by measuring the outputs or effects presented in Table 2-6.

TABLE 2-6
OUTPUTS OR EFFECTS MEASURED TO DETERMINE RESPONSIVENESS OF ALTERNATIVES TO THE SUBSISTENCE ISSUE

Output or Effects to be Measured	Unit of Measure
Anadromous fish	M lbs
Deer	population and distribution
Bear	mapped by subsistence use area
Moose	mapped by subsistence use area
Mountain Goat	mapped by subsistence use area
Waterfowl	mapped by subsistence use area
Furbearers	mapped by subsistence use area
Vegetation	M lbs
Firewood	cords
Timber (Logs)	MBF

Source: Forest Plan Revision Interdisciplinary Team

ISSUE

WHAT AREAS OF THE TONGASS SHOULD BE MANAGED TO EMPHASIZE TIMBER HARVESTING?

Overview

In the 1950's, Congress began encouraging establishment of an Alaskan timber processing industry to promote stable year-round employment. To make this proposal economically attractive to the timber industry, long-term timber sale contracts were established. Today, only two of these contracts are still in effect. Congress assured a supply of timber to the purchasers of these contracts and to independent contractors when it passed the Alaska National Interest Lands Conservation Act (ANILCA) in 1980. ANILCA provided for the availability of 4.5 billion board feet of timber each decade from the Tongass National Forest. To reduce the cost of harvesting marginally economical timber and to offset the effects of designating approximately 5.4 million acres of Wilderness elsewhere on the Tongass, ANILCA also resulted in establishment of the Tongass Timber Supply Fund (TTSF) .

Public opinion is sharply divided on whether or not the long-term contracts, the current timber sale program of 4.5 billion board feet per decade, and the TTSF should be maintained. The majority of individual respondents from Coffman Cove, Hobart Bay, Hoonah, Hydaburg, Ketchikan, Petersburg, and Skagway want the current timber sale program to continue with a mix of management emphases to include other resources. Cities and organizations that want the current timber sale program to continue include: Alaska Loggers Association Inc., City and Borough of Sitka, City of Wrangell - Economic Development Director, Herring Bay Lumber Co., Hoonah City Council, Hull Cutting Co., Ketchikan Chamber of Commerce, Koncor Forest Products Co., Snow Mountain Pine Company, and Western Forest Industry Association.

These individuals and groups believe the Forest Service has an obligation to maintain local and regional economies by continuing the long-term timber sale contracts and the annual timber sales program. They feel that a steady, predictable, long-term timber supply should be assured so that industry can plan its investment strategy. They argue that, in depressed markets, the Forest Service should reduce the costs of timber harvest by maintaining the TTSF and by

providing timber sales that are more economically feasible. They feel that a significant amount of the high-value timber stands were removed from timber production by being designated Wilderness through ANILCA. These people believe the TTSF was created by Congress to offset the loss created by Wilderness and National Monument designations and that Congress should fulfill its commitment.

The majority of respondents from Angoon, Auke Bay, Craig, Douglas, Elfin Cove, Gustavus, Kasaan, Klawock, Pelican, Point Baker, Tenakee Springs, and the Lower 48 want the 4.5 billion board feet per decade timber sale program reduced. Cities and organizations sharing this viewpoint include: Alaska Discovery, City of Pelican, City of Port Alexander, City of Tenakee Springs, City of Yakutat, Haida Corporation, Hollis Community Council, Inc., Klawock Cooperative Association, Narrows Conservation Coalition, Sierra Club, Sitka Advisory Committee, Southeast Alaska Conservation Council, Sumner Strait Fish and Game Advisory Committee, The Mountaineers, The Wildlife Society, Wilderness Society, and Yakutat Fishermen's Association.

These organizations believe the long-term contracts should be terminated, that 4.5 billion board feet of timber each decade is more than the Forest is capable of producing, and that the TTSF should not be used to support below-cost timber sales. They believe the large companies dominate the timber sales program and unfairly compete with small companies who purchase short-term sales. They are concerned that long-term contracts are not flexible enough to address other resource issues or changes in management emphasis. They want to see more emphasis on non-commodity resources than what is given in the current plan.

A number of communities are split in their opinions of managing the Forest to emphasize timber harvest. Half of the respondents want the same mix of emphases. The other half including, Edna Bay, Haines, Juneau, Sitka, Thorne Bay, Wrangell and Yakutat, want less timber harvest.

Interrelationship with Other Major Issues

Scenic Resources. Timber harvesting, roading and log transfer facilities change the scenic character of the Forest landscape. Access to scenic views may be created through harvest activities. Harvest units may be evident from travel corridors, overlook points, and areas of recreational use.

Recreation. Timber harvesting can be complementary to motorized recreation in that roads are constructed and maintained to support harvest activities, increasing access to different areas on the Forest and dispersing recreation. It may be considered in conflict with non-motorized recreation by some Forest users because of noise and increased traffic occurrence.

Fish and Wildlife Habitat and Subsistence. In some areas, Sitka black-tailed deer and black bear populations have increased as timber harvesting has created openings for forage. However, removal of extensive areas of the forest canopy can reduce thermal cover needed for wildlife. Likewise, timber harvesting can affect the availability of large woody debris and thermal protection needed for fish rearing. Second-growth timber stands may not provide the food and cover to support historic population levels of some wildlife species. Logging road crossings on perennial streams may affect water quality, fish passage, and spawning habitat. Some people consider creating openings and constructing roads beneficial for subsistence, while others consider it detrimental.

Wilderness. Timber harvesting will remove characteristics associated with potential Wilderness.

Transportation and Mineral Development. Timber harvesting will result in more roads which may be used for mineral exploration and development. There is little or no conflict between timber harvesting and transportation and mineral development.

Local Lifestyles. Emphasizing timber harvesting may result in a reduction of jobs for those living in communities dependent on commercial fishing, tourism, recreation and subsistence. It may also create additional jobs through the expansion of the existing timber industry, or the introduction of new industry. There is little or no conflict on this issue between communities dependent on timber harvesting and mining.

Indicators of Responsiveness

Table 2-7 presents outputs or effects that may be measured to indicate responsiveness of alternatives to the timber issue.

TABLE 2-7
OUTPUTS OR EFFECTS MEASURED TO DETERMINE RESPONSIVENESS OF ALTERNATIVES TO TIMBER ISSUE

Output or Effects to be Measured	Unit of Measure
Average annual allowable sale quantity	MMBF, MMCF
Scheduled volume class	
Low	% volume
Medium	% volume
High	% volume
Timber harvest method	
Even-aged	% volume
Uneven-aged	% volume
Annual reforestation after final harvest	
Natural	% acres
Planting	% acres
Annual timber stand improvement	M acres
Harvest in riparian areas	M acres
Old growth remaining after first ten years	M acres
Percent suitable forest land of total tentatively suitable acres	% acres
Long-term sustained yield	MMBF, MMCF
Timber sale program quantity	
Long-term contract areas	
Sawlog volume	MMBF, MMCF
Utility volume	MMBF, MMCF
Short-term contract areas	
Sawlog volume	MMBF, MMCF
Utility volume	MMBF, MMCF

Source: Forest Plan Revision Interdisciplinary Team

ISSUE **WHAT ROAD SYSTEM SHOULD BE DEVELOPED ON THE TONGASS NATIONAL FOREST?**

Overview

The transportation system in Southeast Alaska evolved almost entirely to access logging sites. Today, some of the Forest roads linking island communities have been upgraded and incorporated into the State Highway System; a trend that is expected to continue in the future. In some areas, such as Prince of Wales Island, transportation networks have been developed between some log transfer facilities and existing communities.

The majority of individual respondents from some communities, including, Angoon, Edna Bay, Gustavus, Haines, Ketchikan, Point Baker, Tenakee Springs, Thorne Bay, and from the Lower 48 do not want additional roads, additional log transfer facilities, nor do they want to be connected to other existing roads. They believe that roads and transfer facilities destroy the scenic landscape and the unique characteristics of Southeast Alaska's undeveloped areas. They also believe that access results in concentrated use of and increased competition for fish, wildlife and recreation resources.

Cities and organizations sharing this opinion include: City of Pelican, City of Port Alexander, City of Tenakee Springs, City of Yakutat, Haida Corporation, Sumner Strait Fish and Game Advisory Committee, Yakutat Fish and Game Advisory Committee, and Yakutat Fishermen's Association. City of Yakutat, and Sumner Strait Fish and Game Advisory Committee recommended that some roads be closed following timber harvesting activities. In addition, Yakutat is opposed to having the community connected to Canada by road.

The majority of respondents from other communities, including, Auke Bay, Coffman Cove, Hoonah, Hyder, Juneau, and Sitka, favor additional roads, additional transfer facilities, and encourage connecting existing roads. They point to the need for additional public access for subsistence and recreation use, and to the increased economic opportunities that roads provide. They believe that roads should remain open following timber harvest activities to provide additional access. They want road alternatives considered that connect Southeast Alaska to Canada. Organizations supporting this opinion include: Alaska Loggers Association, Inc., Alaska State Senate, AMEX Mineral Resources Company, City and Borough of Sitka, City of Wrangell - Economic Development Director, City of Wrangell - Mayor, Ketchikan Area State Parks Advisory Board, Ketchikan Chamber of Commerce, Koncor Forest Products Co., State of Alaska - Office of the Governor, United 4-Wheel Drive Associations, and Whitestone Logging, Inc.

Respondents from Hydaburg, Meyers Chuck, and Port Alexander favor existing road management. Half of respondents from Wrangell want more, while half want less. Respondents from Douglas, Pelican and Petersburg are split between reducing emphasis on road development, and mixing road development with other Forest uses.

Interrelationship with Other Major Issues

Scenic Resources. The Forest landscape will be altered by road construction and may provide access to areas which are currently inaccessible.

Recreation. Roads can provide roaded recreation, access to recreation places, and can facilitate dispersed recreation. Roads may be considered in conflict with non-motorized recreation by some Forest users.

Fish and Wildlife Habitat and Subsistence. Roads can provide access to fish and wildlife habitat and can provide additional subsistence opportunities. Road

crossings on perennial streams can affect water quality, spawning habitat and fish passage. Because of the access that roads provide, increased competition for and illegal harvest of these resources can result.

Wilderness. Roading will remove primitive characteristics associated with potential Wilderness.

Timber Harvesting and Mineral Development. The construction of roads provides access for timber harvesting and mineral development. There is little or no conflict between this issue and timber harvesting and mineral development.

Local Lifestyles. Emphasizing transportation can benefit communities dependent on timber harvesting and mining and those dependent on commercial fishing, tourism, recreation, and subsistence. While roads can benefit recreation and tourism, some communities prefer the isolation available without roads.

Indicators of Responsiveness

Responsiveness of alternatives to this issue MAY be evaluated by measuring the outputs or effects presented in Table 2-8.

TABLE 2-8
OUTPUTS OR EFFECTS MEASURED TO DETERMINE RESPONSIVENESS OF ALTERNATIVES TO THE TRANSPORTATION ISSUE

Output or Effects to be Measured	Unit of Measure
Total roads by decade	miles
Arterial and collector road construction	miles
Local road construction	miles
Total roads suitable for public use by decade	
Passenger car	miles
High clearance vehicles only	miles
Total roads closed to public use	miles
Total log transfer facilities	units
Pre-roading	miles

Source: Forest Plan Revision Interdisciplinary Team

ISSUE

WHAT AREAS AND ACCESSABILITY SHOULD BE EMPHASIZED FOR EXPLORATION, DEVELOPMENT, AND PRODUCTION OF MINERAL AND ENERGY RESOURCES?

Overview

The Tongass National Forest contains immense mineral resources. Minerals that occur on the Forest range from precious metals to chemical grade minerals. Mining and mineral exploration are not new to Southeast Alaska. In fact, mining activities have occurred for over one hundred years. Juneau, the state capitol, was founded on gold discoveries. Today, along with new explorations, many historical mineral deposits are being revisited. This renewed interest in mining could, directly or indirectly, employ many people in Southeast Alaska.

The majority of individuals responding from Edna Bay, Point Baker, and Wrangell are opposed to emphasizing access for mineral and energy exploration and

development. The City of Pelican, City of Port Alexander, City of Tenakee Springs, City of Yakutat, Sumner Strait Fish and Game Advisory Committee, and Yakutat Fishermen's Association are also opposed to emphasizing mineral exploration and development on the Tongass. These individuals and groups believe that mineral resource development will adversely affect other resources, and think that mitigation requirements, established to minimize impacts, do not take place or are not adequately documented. Many suggest that mineral development be discouraged or prohibited in prime fish and wildlife habitat and in Wilderness because they feel protection of fish, wildlife, and Wilderness resources are always more important than mineral resources.

The majority of respondents from Juneau, Hyder, Kasaan, Sitka, and the Lower 48 support more emphasis on access for mineral exploration and development. Organizations sharing this opinion include: AMEX Mineral Resources Company, City and Borough of Sitka, Greens Creek Mining Company, and USDI Bureau of Mines. Some of these groups and individuals believe the Forest Service does not consider mineral resources equally with other resources in the planning process and that direction is overly restrictive--emphasizing surface resource use and protection, over mineral resource availability and use. This inequity, they suggest, does not truly manifest the multiple-use concept. Some companies commented that their industry requires long-term financial commitments, and that the land base of the Tongass National Forest was too volatile and unstable to invest in mineral exploration and development activities.

Those responding from Craig, Gustavus, Hobart Bay, Hydaburg, Pelican, and other Alaskan communities favor maintaining current management emphasis for mineral exploration and development, and a mix with other Forest uses. Supporting this opinion are Alaska Loggers Association, Inc., Alaska State Senate, City of Wrangell - Economic Development Director, FMC Gold Company, Ketchikan Chamber of Commerce, Koncor Forest Products Co., and the State of Alaska - Office of the Governor.

Respondents from Coffman Cove, Douglas and Petersburg are split three ways in their opinions. Some want more emphasis, others want less, and still others want a mix. Also split in their opinion are respondents from Hoonah. Some are satisfied with current emphasis on minerals, while others want more emphasis. Ketchikan, Port Alexander and other Alaska communities are also split with about half wanting more emphasis and half wanting a mix.

Interrelationship with Other Major Issues

Scenic Resources. The scenic character of the Forest landscape may be changed by surface mining, tailings disposal, and by construction of roads and facilities for mineral activities. Often the change is long term. Most mines in Southeast Alaska are underground so scenic character may be retained through reclamation.

Recreation. Mining roads could increase access for motorized recreation. However, increased noise and traffic from mineral activities may affect non-motorized recreation users near mining access corridors or the mine site.

Fish and Wildlife Habitat and Subsistence. Surface mining activities could affect water quality, and wildlife may be affected by direct loss of habitat and increased noise levels. Associated road construction could provide access for hunting, fishing, and subsistence opportunities although these roads could be closed for public safety reasons in the vicinity of the mineral activities.

Wilderness. Mineral exploration activities are usually short-term and generally do not leave visual alteration of the surface. However, Wilderness values will be affected by mineral exploration and development activities.

Timber Harvesting, Transportation and Mineral Development. Roads constructed for mineral development can also provide access for timber harvesting. There is little or no conflict between mineral development, transportation, and timber harvesting.

Local Lifestyles. There is little or no conflict between this issue and communities dependent on timber harvesting and mining. Communities dependent on commercial fishing, tourism, recreation, and subsistence may consider mining to conflict with their values.

Indicators of Responsiveness

Responsiveness of alternatives to this issue may be evaluated by measuring the outputs or effects presented in Table 2-9.

ISSUE

WHAT AREAS AND WHAT AMOUNT OF ROADLESS LANDS SHOULD BE RECOMMENDED FOR WILDERNESS DESIGNATION AND WHAT KINDS OF USES SHOULD BE PERMITTED?

Overview

One of the major issues identified in the 1979 Tongass Land Management Plan related to how much land and which areas should be formally designated as Wilderness. Some organizations promoting Wilderness designation considered Alaska to be the Nation's last opportunity to preserve large tracts of lands that were relatively untouched by human activity. To these organizations, formal Congressional designation was seen as the only long-term guarantee that there would be no future major development in these areas. Stressing Alaska's storehouse of minerals and timber, others felt that resource development should be permitted and that Wilderness designation would only 'lock-up' valuable resource development opportunities. Although approximately 5.5 million acres were added to the National Wilderness Preservation System on the Tongass in 1980, the amount and location of Wilderness continues to be an issue.

The majority of individual respondents from Auke Bay, Craig, Douglas, Gustavus, Point Baker, Skagway, Tenakee Springs, Wrangell, and the Lower 48 want additional areas designated as Wilderness. Cities and organizations sharing this position include: City and Borough of Sitka, City of Pelican, City of Tenakee Springs, Klawock Cooperative Association, National Wildlife Federation, Southeast Alaska Conservation Council, Sumner Strait Fish and Game Advisory Committee, Wildlife Society - Alaska Chapter, and Yakutat Fishermen's Association. They want additional areas designated as Wilderness to protect these areas from timber harvest, more roads, and mineral development. They also want motorized access and fish enhancement in Wilderness.

The majority of individual respondents from Ketchikan, Sitka and other Alaska communities want less Wilderness while individuals from Coffman Cove, Hobart Bay, Hoonah, Hydaburg, Klawock, Petersburg, and Thorne Bay want the same amount of Wilderness currently designated.

TABLE 2-9
OUTPUTS OR EFFECTS MEASURED TO DETERMINE RESPONSIVENESS OF ALTERNATIVES TO THE MINERAL AND ENERGY DEVELOPMENT ISSUE

Output or Effects to be Measured	Unit of Measure
Identified locatable mineral development potential:	
Open, general	acres
Open, restrictive	acres
Open, very restrictive	acres
Withdrawn	acres
In-place identified commodity values:	
Gold	Troy oz
Silver	Troy oz
Platinum group	Troy oz
Cobalt	tons
Nickel	tons
Copper	tons
Lead	tons
Zinc	tons
Molybdenum	tons
Rare earths	tons
Undiscovered locatable mineral potential:	
Open, general	acres
Open, restrictive	acres
Open, very restrictive	acres
Withdrawn	acres
In-place undiscovered commodity values:	
Gold	Troy oz
Silver	Troy oz
Platinum group	Troy oz
Cobalt	tons
Nickel	tons
Copper	tons
Lead	tons
Zinc	tons
Molybdenum	tons
Rare earths	tons
Plan of operations	units
Salable minerals:	
Sold	cu yds
Free use	cu yds
In-service	cu yds

Source: Forest Plan Revision Interdisciplinary Team

Opinion was split in the communities of Edna Bay and Haines with about half of the respondents wanting more Wilderness designated and half wanting that currently designated. Likewise, Juneau was split with some wanting more, some less, and some the same.

Other cities and organizations believe there is enough Wilderness and do not want additional areas designated; but, they also want access and use limited in current Wilderness areas to retain pristine characteristics. These include: the City of Wrangell - Economic Development Director, Hollis Community Council, Inc., and the Narrows Conservation Coalition.

Several cities and organizations want fewer areas designated as Wilderness than currently exists. These include: Alaska Loggers Association, Inc., Alaska Miner's Association, Alaska State Senate, AMEX Mineral Resources Company, City and Borough of Sitka, FMC Gold Company, Greens Creek Mining Company, Hull Cutting Company, Ketchikan Chamber of Commerce, Koncor Forest Products Company, Snow Mountain Pine Company, United 4-Wheel Drive Associations, and Whitestone Logging, Inc.

Ketchikan State Parks Advisory Board, City and Borough of Sitka, Whitestone Logging, and the Alaska Loggers Association recommend that portions of existing Wilderness be made available for timber harvest in exchange for other wilderness-like areas.

Interrelationship with Other Major Issues

Scenic Resources. Wilderness designations would preserve scenic resources which may be seen from travel corridors. There is little or no conflict between Wilderness and scenic resources.

Recreation. Retaining lands in an unroaded and wilderness condition will enhance primitive recreation opportunities and will limit some types of motorized recreation opportunities.

Fish and Wildlife Habitat and Subsistence. Areas designated as Wilderness will generally provide for fish and wildlife habitat and subsistence. There is little or no conflict between this issue and fish and wildlife habitat and subsistence.

Timber Harvesting, Transportation and Mineral Development. If additional areas receive Wilderness designation, the available timber supply would be reduced to the extent that these areas contain suitable timberland, and road construction would be precluded. Areas designated as Wilderness are withdrawn from mineral entry subject to valid existing rights established prior to the date of Wilderness designation. Wilderness designation will eliminate or severely curtail mineral exploration and development, and reduce the availability of mineral resources. Areas presently designated as Wilderness are removed from the suitable timber base and withdrawn from mineral entry.

Local Lifestyles. Wilderness designation can result in a reduction of jobs for those employed by the timber and mining industries, since the timber supply and access to minerals for development will be reduced. There is little or no conflict between Wilderness and communities dependent on commercial fishing, tourism, recreation and subsistence.

Indicators of Responsiveness

Responsiveness of alternatives to this issue may be evaluated by measuring the outputs or effects displayed in Table 2-10.

TABLE 2-10
OUTPUTS OR EFFECTS MEASURED TO DETERMINE RESPONSIVENESS OF ALTERNATIVES TO THE WILDERNESS ISSUE

Output or Effects to be Measured	Unit of Measure
Wilderness areas	M acres
Roadless management areas	M acres
Areas recommended for formal Wilderness designation	M acres

Source: Forest Plan Revision Interdisciplinary Team

ISSUE

WHAT WAYS SHOULD NATIONAL FOREST LANDS BE MANAGED TO PROVIDE FOR THE LOCAL LIFESTYLES OF SOUTHEAST ALASKA COMMUNITIES?

Overview

Employment and income generated by the government sector, timber, fishing, mining, and tourism industries is critical to the social and economic well-being of existing and emerging Southeast Alaska communities. Some individuals also rely on subsistence use of Forest resources to provide needed food which is supplemental to their income. In some situations, a positive increase in the development of one industry or lifestyle may negatively affect another.

Dependency on the land and natural resources as part of one's livelihood is an economic fact of life throughout much of Southeast Alaska. Because of this dependency, management of the Tongass National Forest has been, and continues to be, closely tied to the issue of regional and community socio-economic development and structure. Minor changes in Forest programs can sometimes cause major changes in community lifestyles.

Early efforts by the Forest Service to establish a timber processing industry in Southeast Alaska were viewed as a means of promoting stable year-round employment. Since that time however, State land selections authorized by the Alaska Statehood Act of 1959 have resulted in the emergence of numerous remote communities throughout Alaska. The stability and structure of some of these communities is directly influenced by Forest management activities while other communities are not as directly dependent or affected by such activities. Differences in objectives and perceived needs can result in disagreements between some communities and the Forest Service.

As might be expected, views on this issue are divided. The majority of individual respondents from Hoonah and Sitka support emphasizing timber and mining. Several cities and organizations also emphasize development; these include: AMEX Mineral Resources Company, City and Borough of Sitka, Greens Creek Mining Company, Ketchikan Chamber of Commerce, Koncor Forest Products Co., and Whitestone Logging, Inc.

These groups and individuals believe that employment and income generated by the timber and mining industry is critical to the social and economic development of Southeast Alaska. They think that a subsistence lifestyle is impossible without a stable economy based on timber. Several people mentioned that maintaining the present timber sale program of 4.5 billion board feet per decade is needed for

community social and economic stability. Many communities believe the timber industry is the only option for employment other than fishing or welfare, and that fishing is not a lucrative business for most people. They think that the jobs provided by timber, both directly and indirectly, have a much higher wage rate than services and retail trade jobs provided by tourism. The latter are viewed as being seasonal jobs, whereas timber and mineral industry employees work year-round. This group did not see any conflicts between logging and mineral development, and the recreation industry. They stated that logging has not hurt wildlife or fish.

A second group of individual respondents from Angoon, Auke Bay, Craig, Douglas, Edna Bay, Gustavus, Pelican, Petersburg, and the Lower 48 want management to emphasize tourism, wildlife, recreation, and subsistence. Cities and organizations including: City of Port Alexander, City of Tenakee Springs, City of Yakutat, Haida Corporation, Hoonah City Council, Juneau Area State Parks/Advisory Board, Juneau Audubon Society, Ketchikan Area State Parks Advisory Board, Sitka State Parks Advisory Board, Sumner Strait Fish and Game Advisory Committee, national chapter of the Wildlife Society, and Yakutat Fishermen's Association support this viewpoint.

These groups and individuals believe there are areas of economic importance other than timber. They feel the economic and social future of Southeast Alaska depends upon the tourism, recreation, and fishing industries. Their opinion is that timber has only short-term social and economic benefits at the expense of long-term gains which can be provided by tourism, recreation, and fishing. They expressed a desire for the Forest Service to help communities switch from a timber economy to a tourist and fishing economy which was viewed as being more compatible with the subsistence lifestyles they wanted. Some communities have opted for tourism development rather than timber and feel the Forest Service should designate key areas for them for undisturbed recreation and subsistence. Their position is that individual communities should prescribe activities in their local area, rather than their being affected by towns dependent on timber.

A third group of individuals commented that a combination of timber, mining, and other commodity industries with tourism, recreation and fishing would be most desirable. Overall, they feel a balance should be sought between preservation and economic development. Individual respondents supporting this management emphasis were from Coffman Cove, Ketchikan, Klawock, Point Baker and Other Alaska communities. Organizations sharing this viewpoint include: Alaska State Senate, FMC Gold Company, Ketchikan Chamber of Commerce, Narrows Conservation Coalition, Snow Mountain Pine Company, State of Alaska - Office of the Governor, Sumner Strait Fish and Game Advisory Committee, and Western Forest Industries Association.

Respondents from Thorne Bay, Wrangell, and Yakutat were split equally with some wanting emphasis on recreation, tourism, and fishing; and others wanting a mix between these and commodity industries. Juneau residents were split between emphasizing timber harvesting, mining, and a mix between these and amenity industries.

Interrelationship with Other Major Issues

Scenic Resources. Managing to maintain local lifestyles that are dependent on timber harvesting and mining will provide access to scenic areas. However, the development associated with mineral access will change the scenic character of the Forest landscape. Managing to support communities dependent on commercial

fishing, recreation, tourism, and subsistence will have little or no conflict with scenic quality.

Recreation. Maintaining communities dependent on timber harvesting and mining will provide roaded recreation opportunities. However, the noise and traffic associated with this development is unpleasant to some recreationists. Managing for commercial fishing, recreation, tourism, and subsistence will have little or no conflict with recreation.

Fish and Wildlife Habitat and Subsistence. Supporting communities with economic bases in timber harvesting and mining can benefit wildlife and subsistence by creating openings for forage and access to subsistence use areas. However, removal of extensive areas of the Forest can reduce cover needed for wildlife, and can affect the availability of large woody debris and thermal protection needed for fish rearing. Road crossings on perennial streams may affect water quality, fish passage and spawning habitat. Roads can also result in more competition for Forest resources between subsistence users and recreation users. Managing for commercial fishing, recreation, tourism, and subsistence uses will have little or no conflict with fish and wildlife habitat and subsistence.

Wilderness. Managing to support communities based on timber harvesting and mining will remove the primitive characteristics associated with potential Wilderness. There is little or no conflict between commercial fishing, recreation, tourism, Wilderness and subsistence uses with exception of those communities wanting motorized access and commercial tourism facilities within Wilderness.

Timber Harvesting, Transportation and Mineral Development. There is little or no conflict between managing to support communities dependent on timber harvest and mining and this issue. Managing to support economies dependent on tourism, recreation, commercial fishing, and subsistence uses will result in a reduction of available timber supply, increased road costs, and conflict with mineral development.

Indicators of Responsiveness

Responsiveness of alternatives to this issue may be evaluated by measuring the outputs or effects presented in Table 2-11.

TABLE 2-11
OUTPUTS OR EFFECTS MEASURED TO DETERMINE RESPONSIVENESS OF ALTERNATIVES TO THE LIFESTYLE ISSUE

Output or Effects to be Measured	Unit of Measure
Population	
Total	numbers
Change	numbers
Employment	
Timber	M $
Recreation	M $
Hunting	M $
Sport fishing	M $
Commercial fish	M $
Mining	M $
Total	M $
Returns to government	M $
Payments to state government	M $

Source: Forest Plan Revision Interdisciplinary Team

CHAPTER 3
RESOURCE SETTING

CHAPTER 3 - RESOURCE SETTING

INTRODUCTION

This chapter focuses on current situation of the resources on the Tongass National Forest, including supply and demand considerations. Chapter 3 is presented in three sections. The first section provides a general description of the Forest, which includes the physical, biological, social, and economic settings of the Forest. The second section describes the social and economic environment in detail, including descriptions of the communities in the vicinity of the Tongass National Forest. The last section sets forth the current natural resource situation on the Tongass with detailed descriptions for each resource.

GENERAL DESCRIPTION

The 16.8 million acre Tongass National Forest, located in Southeast Alaska, is part of the Alexander Archipelago, and occupies less than seven percent of the state's area. The Tongass runs from Dixon Entrance in the south to Yakutat in the North, and is bordered on the east by Canada, and on the west by the Gulf of Alaska. It extends approximately 500 miles north to south, and approximately 120 miles east to west. Figure 3-1 is a vicinity map of the Tongass.

Southeast Alaska includes a narrow mainland strip and over one thousand offshore islands. Together, the islands and mainland equal nearly 11,000 miles of meandering shoreline, with numerous bays and coves. A system of seaways separates the many islands and provides a protected waterway called the Inside Passage. Federal lands comprise 97 percent of southeast Alaska, and most of those lands are managed within the Tongass National Forest and Glacier Bay National Park. The remaining land is held in State, Native and private holdings.

Landownership patterns are highly complex. Many State, community, and private inholdings exist within the Tongass National Forest. Geographically, they are scattered throughout the Forest. These inholdings are the result of State and Native selections, Native allotments, Townsite eliminations, homesteads, trade and manufacturing sites, patented mining claims, and other eliminations which conveyed land from Federal ownership. Major private landowners are the State of Alaska, Native Corporations, and communities, cities, and boroughs. The Department of Interior administers the National Park at Glacier Bay.

PHYSICAL SETTING

The mainland and islands of Southeast are mountainous, often abruptly rising from sea level to several thousand feet. Elevations range from sea level to approximately 3,000 feet in the southern sections of the forest, and from sea level to 2,500 feet farther north. The mountain valleys provide reservoirs for huge icefields and glaciers located primarily on the mainland.

More than one million years ago, all but the highest mountain peaks in Southeast Alaska were covered by ice. The great erosional powers of these vast expanses of ice molded and shaped the landscape as the glaciers moved downhill under their own weight. Following the paths of least resistance, generally river valleys along fault lines which dissected the landscape, these glaciers carved the bedrock below them. When the ice receded and uncovered the land, the more resistant mineral-rich rocks remained, revealing a network of islands dissected by numerous streams, U-shaped valleys, and fiords. It is this modification by glaciers that gives Southeast Alaska's landscape its unique character.

The configuration of the coastline, the warm Japanese ocean current, and high coastal mountains provide all of the ingredients necessary to produce abundant rainfall. The Tongass is a temperate rainforest, with annual precipitation

FIGURE 3-1
TONGASS NATIONAL FOREST VICINITY MAP

averaging more than 100 inches throughout. Precipitation is highest in the southern areas, and decreases as one moves north. At higher elevations, more than 200 inches of snow may fall, perpetuating the existing icefields and glaciers. Storms and heavy to moderate precipitation can occur year round, although the greatest frequency of storms and heavy precipitation occurs from September through November. The abundant moisture feeds many small streams, rivers, and lakes which dot the landscape.

Southeast Alaska has a maritime climate which is dominated by the moderating influence of the Pacific Ocean. In the summer, this provides a cooling influence, while in winter, temperatures are warmer than would be expected for these latitudes. Normal temperatures range from the mid 40's to the mid 60's in the summer, and from the high teens to the low 40's in the winter. During the

warmer months, temperatures are highest inland and lowest along the coasts, while in the colder months, the reverse is true. While winter temperatures seldom go below zero degrees Fahrenheit, wind and high levels of precipitation persist throughout the year.

Biological Setting

The coastal forest of Southeast Alaska is part of the cool, very moist temperate rain forest that extends along the Pacific coast from Northern California to Cook Inlet in Alaska. Most of the forest is old growth. The forest extends from sea level to an elevation of about 3,000 feet in the south, and from sea level to about 2,500 feet further north.

In the southern part, the forest is composed primarily of western hemlock and Sitka spruce with a scattering of mountain hemlock, western redcedar and Alaska-cedar. Red alder is common along streams, beach fringes, and on soils recently disturbed by logging and landslides. Black cottonwood grows on the floodplains of major rivers and recently deglaciated areas on the mainland. Subalpine fir and Pacific silver fir occur occasionally at tree-line and near sea level. The same species occur farther north, with the exception of western redcedar.

Blueberries, huckleberry, Sitka alder, Devil's club, and salal are common shrubs in the forest. The forest floor is composed of plants such as deerheart, dogwood, single delight and skunk cabbage. Because of the high rainfall and resulting high humidity, mosses grow in great profusion on the ground, on fallen logs, on the lower branches of trees, and in forest openings.

Grass-sedge meadows usually lie at low elevations, often along the coast. Meadow vegetation consists mainly of grasses, sedges, and other herbaceous plants. Stands of willow border many of the stream channels. Interspersed throughout the forest are muskeg, or bog plant communities, dominated by sphagnum mosses and sedges. The drier areas in the muskegs support low shrubs, forbs, and a few scattered hemlocks and shore (lodgepole) pine.

Extensive alder thickets often occur between the beach and the forest, between the treeline and the alpine meadows, and extending from treeline downward through the forest in avalanche chutes and along streams. These thickets are also found in some of the clearcuts immediately following timber harvest. Beneath the alder there is often a well developed grass and fern layer, as well as a number of herbs and shrubs.

The alpine zone usually lies above 2,500 to 3,000 feet. It occupies the area above the coastal forest and is separated from the forest by a subalpine or transition zone. Resident plants have adapted to snowpack and wind abrasion by evolving low-growth forms. Low, mat-forming vegetation covers most of the area, with cushion-like plants occupying crevices on exposed rock outcrops and talus slopes. The most important plants are the low heath shrubs, especially cassiopes and mountain-heaths.

The forests, shorelines, streams, and rivers of southeast Alaska provide habitat for over 300 species of birds and mammals, including both game and non-game animals such as brown and black bear, Sitka black-tailed deer, moose, wolf, mountain goat, and numerous small animals such as beaver, otter, and marten. The coastline provides an ideal habitat for a large population of bald eagles, and wetlands provide nesting habitat for many waterfowl.

A highly productive marine environment includes an abundance of marine mammals, halibut, herring, and hundreds of shellfish. Both resident and anadromous fish are found within and adjacent to the Forest, including all five species of Pacific salmon, dolly varden, and trout.

Social and Economic Settings

Southeast Alaska's society is influenced by a variety of cultures, from its earliest peoples to its most recent inhabitants. The abundant resources of the forest and waters have provided food, shelter, and livelihood to its inhabitants for thousands of years. The first inhabitants to the area, the Tlingit and Haida, adapted well to the coastal environment, and were able to subsist on the natural resources of the region and develop a rich culture. The numerous waterways allowed for mobility which aided in expanding trade and gathering food.

In the 1700's, the Russians began exploration in Alaska. The fur trade, primarily sea otter pelts, was the main force driving European colonization. When most of the sea otter populations were depleted, the fur industry declined, and Russia lost interest in her North American colony. Alaska was then sold to the U.S. in 1867.

As colonization continued with the U.S. occupation, new industries developed. In the late 1800's commercial fish canning became an important part of the economy of Southeast. During that same period, the discovery of gold brought thousands of miners to the area, many of whom were then followed by their families. The most important of the early discoveries occurred in Juneau. In the early 1900's, the Depression brought a decline in fish prices and mining employment. The impact of World War II resulted in the closures of the last remaining mines.

The timber resources were utilized by the earliest inhabitants for shelter, utility, and cultural purposes. The Russians also harvested timber for building ships and structures, but commercial timber harvest did not become developed until the 1900's. In the earlier part of the century, small timber mills were operated in a few communities, but it was not until the mid 1900's, with the development of two large-scale pulp mills in Ketchikan and Sitka, that the timber industry became a major economic factor of southeast.

In the 1950's Alaska focused its attention on statehood. On January 3, 1959, President Eisenhower signed the proclamation establishing Alaska as our 49th state. The resultant economic shift towards more government employment and an expanding timber industry had implications beyond changes in population levels and distribution. It was a shift towards a diversified economy, with less dependence on extractive and nonrenewable resources, and away from a seasonal economy.

Most of the population of southeast Alaska is concentrated in several urban communities, the largest of which are Juneau, Ketchikan, Sitka and Petersburg. The same industries which dominated southeast Alaska's history: fishing, mining, and timber production, are still prominent industries in most of the urban communities. In addition, tourism, which has increased in its economic importance over the past several years, provides a major source of income to the economies of all communities. Government, especially in Juneau, transportation, and education are also significant sources of income. There are numerous small, rural communities as well, which depend primarily on fishing, timber production, and subsistence for their livelihoods.

THE SOCIAL AND ECONOMIC ENVIRONMENT

INTRODUCTION

This portion of the Analysis of the Management Situation provides a summary of the social and economic conditions of the past and present and helps predict future trends. It aids our understanding of the human environment and the potential effects of forest management on this environment.

This socioeconomic discussion is a summary of a longer document, the Socioeconomic Overview of the Tongass National Forest, dated March 1989. This document is filed in the planning record.

AREA OF INFLUENCE

The area of influence is determined by the links between the Forest's various resources and the people of Southeast Alaska.

Most of the timber sold from the Tongass National Forest is processed by mills in Southeast Alaska, then exported to Japan and other countries in the Pacific Rim. Well over half of all logs harvested in Southeast Alaska come from federal land.

The bulk of recreationists on the Tongass come from within Southeast Alaska. People from other areas of Alaska, other states, and even other nations also visit the Forest.

Many communities in or adjacent to the Tongass National Forest depend upon the Tongass for their municipal water supplies. The communities of Ketchikan, Meyers Chuck, Craig, Hollis, Thorne Bay, Steamboat Bay, Hydaburg, Elfin Cove, Port Alexander, Angoon, Tenakee Springs, Pelican, Funter Bay, Baranof Warms Springs, Kupreanof, Kake, Wrangell, and Petersburg draw their water from the Tongass National Forest. In addition, several logging camps, fish hatcheries, resorts, mines, canneries, and a summer camp also get their water from sources on the Tongass National Forest.

Fisheries also play an important role in the economy of Southeast Alaska. Many migrating salmon started their lives in streams and hatcheries on the Tongass National Forest.

Some management activities on the Tongass National Forest generate revenues for the United States Treasury. These management activities include timber sales, minerals permits, land use fees, and recreation use fees. As established by law, 25 percent of the receipts from the Tongass NF are returned to the State of Alaska for distribution to local governments.

Summary

In summary, the primary influence area for the Tongass National Forest is Southeast Alaska. The zone of secondary influence stretches north and west to the entire state of Alaska, other northwest states, British Columbia, and the Pacific Rim countries, especially Japan. The discussion in this document will focus on the primary area of influence, and only briefly address the secondary area.

POPULATION CHARACTERISTICS

The majority of communities in Southeast Alaska are small, isolated from each other, and accessed only by air or water. Only four communities in Southeast are accessible by land: Skagway, Haines and Klukwan in the north, and Hyder in the south.

Juneau, Alaska's capital, with a population of over 25,000, is the largest community in Southeast Alaska. It is the only community over 20,000 and

represents 40 percent of the entire population of Southeast. The two mid-sized communities in Southeast are Sitka with 8,102 people, and Ketchikan with 12,248 people. Together Juneau, Sitka, and Ketchikan comprise 73 percent of Southeast's population and are its only full service communities. The remainder of the population is scattered in small towns and villages throughout the Southeast. Many of these communities have populations of less than 2,000. (The communities of Southeast Alaska are described in more detail later in this section, under "Community Profiles.")

Growth and Trends

Between 1960 and 1985, Alaska's population grew from 230,400 to 539,600, an increase of 234 percent. Alaska's past and projected population levels are shown in Table 3-1, and Figures 3-2 and 3-3. The greatest amount of population growth occurred during the "boom" period associated with the oil industry, however, population increases took place over the entire period. Projections from state agencies indicate that population increases are likely to continue. An increase of another 79,700 people or 15 percent is anticipated during the next 10 years. A 61 percent population increase is expected over the next 50 years.

Between 1960 and 1985, Southeast Alaska's population also grew, but at a much slower rate, increasing 134 percent. In 1960, Southeast residents made up 16 percent of the state's total population. By 1985, the population of Southeast was only 12 percent of Alaska's total population.

TABLE 3-1
POPULATION: July 1, 1960-1985; STATEWIDE PROJECTIONS FOR 1995, 2005, 2035

	Census Area								
Year (July 1)	Haines	Juneau	Skagway Yakutat - Angoon	Sitka	Wrangell-Petersburg	Ketchikan	Prince of Wales/Outer Ketchikan	SE Alaska	Alaska
1960	800	9,900	2,700	6,400	4,200	8,900	3,100	36,000	230,400
1970	1,400	13,800	2,800	6,200	5,000	10,200	3,700	43,100	308,500
1975	1,500	16,400	2,900	6,900	5,400	10,900	4,300	48,300	384,100
1980	1,762	20,512	3,600	8,144	6,443	11,850	4,085	56,396	419,800
1985	1,991	26,270	3,681	8,160	6,849	12,248	5,021	64,220	539,600
Proj 1995	NA	NA	NA	NA	NA	NA	NA	NA	619,300
Proj 2005	NA	NA	NA	NA	NA	NA	NA	NA	730,100
Proj 2035	NA	NA	NA	NA	NA	NA	NA	NA	868,000

NA = Not Available

Sources: 1960-1979 Estimates - Alaska Population Overview 1982, Alaska Department of Labor, Research and Analysis Section, 1983. Tables II.1 and II.2 and Alaska Population Overview 1982 Table II.3.

1980 - 1985 Estimates - Alaska Population Overview 1985 Estimates, Alaska Department of Labor, Records and Analysis Section, April, 1987. Table III.1.

Projections: 1985 OBERS - BEA Regional Projections : Volume 1 - State Projections to 2035, U.S. Department of Commerce, Bureau of Economic Analysis, 1985. Table 2 - Alaska.

FIGURE 3-2
STATE POPULATION LEVELS

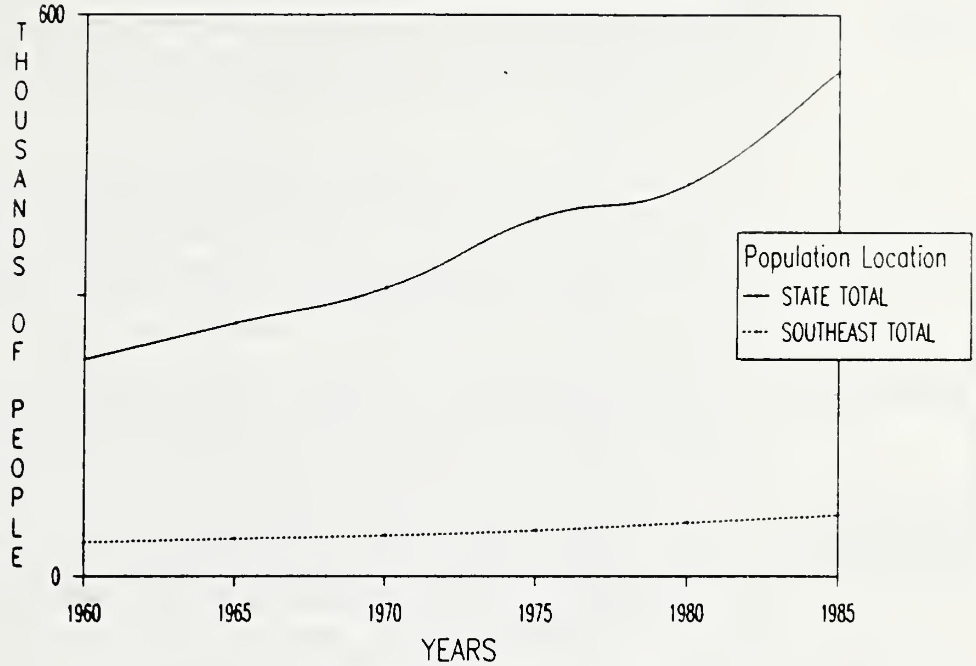
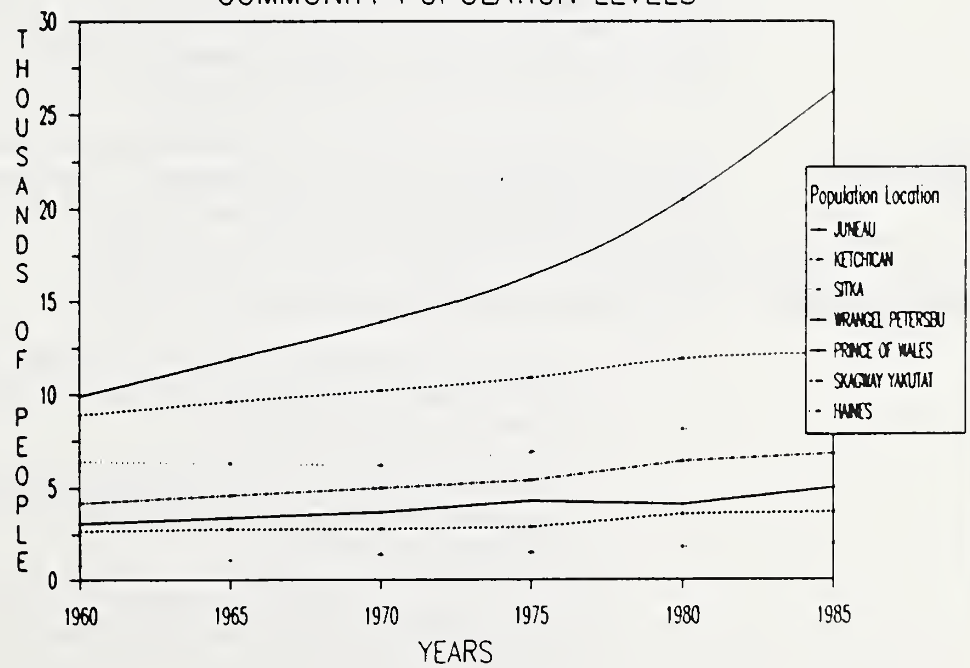


FIGURE 3-3
COMMUNITY POPULATION LEVELS



Age

The median age of Alaska's population is 26 years, while the nation's median population is 30 years. Persons over 65 comprise only 3 percent of Alaska's population, while they comprise 11 percent of the nation's population.

Ethnicity

Many native towns and villages are scattered in isolated locations throughout Southeast. They exemplify the richly diverse lands and lives of Southeast Alaska. The strength of these communities lies in their common tie to subsistence.

Native populations in Alaska are primarily Tlingit, Aleut, Eskimo, Haida, and Athabascan. While native populations nationwide are one percent of the total population, they comprise 13 percent of Southeast Alaska's population. Some Southeast Alaska communities have a greater proportion of Alaska Natives in their populations. Prince of Wales Island, outer Ketchikan, Skagway, Yakutat, and Angoon have populations that are over 40 percent native.

Concentrations

Southeast's population continues to be concentrated in the larger urban areas, with 73 percent living in the communities of Juneau, Sitka, and Ketchikan. The population of all incorporated cities in shown in Table 3-2.

Labor and Poverty Sources

In general, Alaska has a higher proportion of people living below the poverty level than the nation as a whole, while Southeast Alaska has a lower proportion. The national average is 12.4 percent, Alaska's is 14.4 percent, and Southeast Alaska's is 9.3. While nationally, many people living below poverty level are single, Alaska has a greater number of entire families below the poverty level.

Although Southeast Alaska is in good economic condition, the income and poverty levels are not equitable throughout the communities. The larger communities, Ketchikan, Juneau, Wrangell, Petersburg, and Sitka, have income levels well above the national average, with a smaller percentage of people living below poverty levels. This is not the situation in many of the smaller communities. However, since many people in these communities rely on hunting, fishing, gathering and other forms of subsistence use for their livelihood, some of their basic needs are met without an actual financial transaction, and the need for money may be less.

CHANGES IN ALASKA'S ECONOMY

Important structural changes have occurred in Alaska's economy since the Tongass Land Management Plan was implemented. In some instances, these changes helped diversify Southeast's economy and improved its ability to endure the "boom or bust" business cycles.

Sources of Change

The sources of these changes are described here:

1. Volatile oil prices left the state vulnerable to large fluctuations in revenues, making it difficult to plan and finance many state operations and publicly funded projects.

2. Changing landownership patterns resulted in a supply of private timber in Southeast Alaska and a round log export market competing with processed timber products.

3. Changing currency exchange rates altered the competitive status of Southeast Alaska products in the export market.

TABLE 3-2

POPULATION OF TOWNS AND VILLAGES IN SOUTHEAST ALASKA

Towns and Villages	Populations	Percent Native
Angoon	639	83
Coffman Cove	224	0
Craig	915	32
Edna Bay	69	0
Elfin Cove	61	7
Gustavus	218	2
Haines	1,838	19
Hollis	82	12
Hoonah	960	71
Hydaburg	385	85
Hyder	79	1
Juneau	23,729	11
Kake	634	62
Kasaan	41	48
Ketchikan	12,705	15
Klawock	777	66
Klukwan	132	82
Kupreanof	51	73
Metlakatla	1,554	0
Meyers Chuck	30	5
North Whale Pass	50	0
Pelican	238	21
Petersburg and Vic	4,040	11
Point Baker	34	3
Port Protection	57	2
Port Alexander	106	5
Saxman	262	79
Sitka	8,041	18
Skagway	583	7
Tenakee Springs	95	6
Thorne Bay	477	3
Wrangell	2,836	18
Yakutat	588	56

Source: Alaska Department of Fish and Game. "Southeast Alaska Rural Community Resource Use Profiles", January 1989. Some changes in population may have occurred since the publication of this document.

4. Changing interest rates affected investment opportunities, housing starts, and other business activities, both domestically, and abroad. This, in turn, affected demand for raw materials produced in Southeast Alaska.

5. Consumer preferences changed the demand for various goods and services produced in Southeast Alaska.

6. Worldwide political events played an increasingly important role in the state's and region's economic situation.

7. Southeast Alaska's population and economy have grown and matured to the point where the Region can successfully support local trade, and financial industries.

Income

Employment and wages have been summarized for the years 1981 through 1987 in Table 3-3. Data before 1981 was unavailable. Overall employment increased between 1981 and 1986 by nearly 8 percent, falling slightly in 1985 and 1986.

MAJOR INDUSTRIES

Forest Products

Southeast Alaska's economy is characterized by its dependence on three major industries, lumber and paper products, fishing, and tourism. According to recent studies, lumber and paper products is still the number one industry in Southeast, based on employment, but its share of the total is declining as tourism-related employment increases.

Southeast Alaska's forest product mix has changed little since the 1950's when long-term timber sale contracts on the Tongass were created. Major products include dissolving pulp, logs, cants, waneys, woodchips, dimension lumber, and logs. Despite an unchanging product line, the industry has undergone significant structural changes since the TLMP. Only recently has the Alaska-processed wood products market improved. Between 1981 and 1986, total employment in the lumber and paper products industry dropped 3 percent. The biggest decline occurred between 1982 and 1984, when employment fell nearly 25 percent. Wage losses were more persistent, with nearly an 18 percent drop between 1981 and 1986. Because most Alaskan products are exported, fluctuations in timber markets are primarily a function of the international marketplace and do not reflect activities of the region. (See Table 3-4.)

TABLE 3-3

SOUTHEAST ALASKA EMPLOYMENT AND WAGES1/ -- 1981 - 1986

Industry	1981 (#) Employment	1981 ($1000) Wages	1982 (#) Employment	1982 ($1000) Wages	1983 (#) Employment	1983 ($1000) Wages	1984 (#) Employment	1984 ($1000) Wages	1985 (#) Employment	1985 ($1000) Wages	1986 (#) Employment	1986 ($1000) Wages
Nonagri. Wage & Salary	26,995	635,855	27,705	696,371	28,483	745,873	28,661	737,259	29,190	752,234	29,035	753,654
Construction	[illegible],404	54,300	1,514	60,424	2,017	80,843	1,814	64,371	1,665	57,693	1,098	38,590
Building Construction	395	12,848	420	13,657	548	16,996	528	14,809	497	13,834	329	10,072
Heavy Construction	627	28,408	655	32,146	820	41,520	531	24,490	491	22,282	334	15,202
Special Trades	382	13,044	440	14,621	649	22,328	755	25,072	677	21,577	436	13,316
Manufacturing	3,884	107,710	3,861	110,682	3,355	106,688	3,008	91,902	3,236	96,176	3,854	115,768
Food & Kindred Prod 3/	1,125	17,319	1,052	17,418	908	18,585	871	15,871	996	20,866	1,160	23,984
Lumber & Paper Prod 2/	2,576	86,884	2,589	89,508	2,255	83,913	1,946	71,733	2,039	71,052	2,491	87,361
Other Mfg	183	3,507	180	3,756	192	4,190	191	4,298	201	4,258	203	4,423
Trans. Comm. & Utilities	2,506	64,119	2,238	63,476	2,025	56,353	1,950	55,178	2,032	56,419	2,107	56,769
Water Transportation	542	14,247	447	16,252	486	17,022	452	15,883	470	14,812	464	14,328
Air Transportation	760	21,127	634	18,162	492	12,049	469	11,852	469	11,615	526	12,573
Trade	3,847	53,937	4,167	62,027	4,406	70,409	4,576	72,706	4,552	68,278	4,465	64,546
Wholesale	300	7,555	334	8,723	438	12,817	384	11,395	370	10,647	335	9,207
Retail	3,547	46,182	3,834	53,304	3,968	57,592	4,193	61,311	4,183	57,632	4,130	55,342
Food Stores	704	11,129	797	13,270	842	14,662	838	14,946	845	14,070	836	13,958
Eating & Drinking	1,152	10,650	1,245	11,913	1,247	12,450	1,243	12,464	1,342	12,248	1,405	12,621
Other Retail Trade	1,691	24,603	1,792	28,121	1,879	30,480	2,112	39,901	1,996	31,314	1,889	28,763
Finance-Ins. & R.E.	1,088	20,462	957	22,446	992	24,013	1,037	25,936	1,105	27,518	1,164	29,994
Mining, Services & Misc	3,409	56,200	3,850	68,110	4,297	75,082	4,521	80,207	4,488	76,911	4,520	76,451
Hotel, Motel	527	6,267	552	7,397	730	9,220	775	10,110	801	9,866	721	8,938
Medical Services	613	12,992	674	15,220	744	16,454	775	16,433	782	16,073	867	17,508
Other	2,269	36,941	2,584	45,493	2,823	49,408	2,971	53,664	2,905	50,972	2,932	50,005
Government	10,857	278,987	11,119	309,206	11,390	332,484	11,754	346,960	12,113	369,240	11,826	371,534
Federal	2,345	56,792	2,216	56,525	2,163	57,850	2,087	59,233	2,085	62,251	2,084	65,978
State	5,001	147,530	5,313	167,425	5,407	179,764	5,476	182,617	5,520	192,138	5,394	190,599
Local	3,512	74,665	3,591	85,256	3,820	94,870	4,191	105,110	4,508	114,851	4,348	114,958
Military3/												

1/ For nonagricultural wage and salary employment only. These numbers represent a "job count" and do not distinguish between full and part time employment. The employment figures do not include self-employed persons, unpaid family help, domestics, most persons engaged in commercial fish harvesting and agriculture, and military employment.

2/ Seafood Processing

3/ Includes logging, sawmill and pulpmill related employment

Source: Alaska Department of Labor, Research and Analysis Section, Report of Employment and Wages, ES 202

Community stability, as measured through employment and personal earnings, was a major objective of the Forest Plan and ANILCA. To a large extent, the employment objectives from forest products in Southeast Alaska have been met in recent years. Although the industry experienced a decline in the early 1980's, the direct and indirect benefits from logging, sawmill, and pulpmill employment were 13 percent greater in 1988 than in 1980 (see Table 3-4 and Figure 3-4).

TABLE 3-4
SOUTHEAST ALASKA LUMBER AND WOOD PRODUCTION INDUSTRY EMPLOYMENT, FY 1980-1988

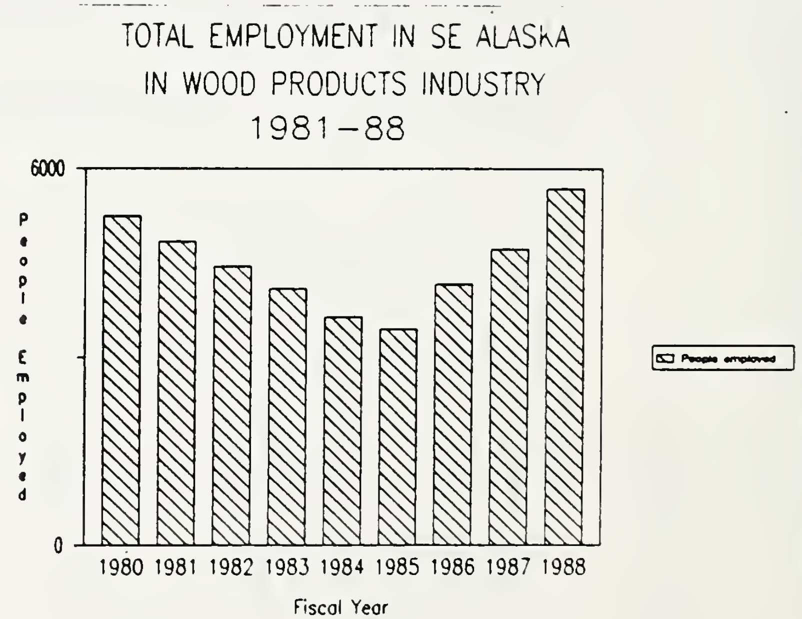
Employment	1980	1981	1982	1983	1984	1985	1986	1987	1988	Annual Average
Direct										
Logging	1,141	1,047	991	1,010	946	1,004	1,239	1,545	1,987	1,212
Sawmills	785	605	540	429	395	363	331	375	467	477
Pulpmills	1,023	1,081	975	854	700	580	772	861	880	858
Total Direct 1/	2,949	2,733	2,506	2,293	2,041	1,947	2,342	2,781	3,334	2,547
Indirect Employment 2/	2,300	2,125	1,950	1,800	1,600	1,500	1,825	1,950	2,350	1,933
Total Employment	5,249	4,854	4,456	4,093	3,641	3,447	4,167	4,731	5,684	4,481

Source: ANILCA 706(a) Draft 1988 Supply and Demand Report Number 8

1/ From Alaska Department of Labor statistics subject to revision. Current as of February 9, 1989

2/ Rounded to the nearest 25 jobs. Data reflect the impact of money re-circulating through the economy and are estimated from a Forest Service input-output model, IPASS, for Southeast Alaska.

FIGURE 3-4



A constant supply of Tongass timber alone cannot assure the maintenance of ANILCA's timber employment objectives. Other controlling factors include exchange rates, the overall Pacific Rim demand for wood fiber and competitiveness of timber suppliers outside the Tongass National Forest. Stable domestic economic growth will increase the demand for timber from the Tongass. It is clear that Alaska producers of wood products can survive, prosper, and create new jobs in a positive macroeconomic environment which promotes exports from the United States.

Table 3-5 shows the total receipts from the Tongass timber program and payments to the State of Alaska. With few exceptions, 25 percent of all monies received (including purchaser road credits) from National Forest is paid to the state. The funds are typically used to benefit public schools and public roads in areas where the Forests are located.

TABLE 3-5
FOREST RECEIPTS AND PAYMENTS TO THE STATE OF ALASKA, FY 1980-1988

Fiscal Year	Tongass Receipts 1/	Payments to Alaska
1980	$ 26,024,494	$ 6,506,124
1981	$ 15,007,944	$ 3,751,986
1982	$ 21,622,764	$ 5,405,691
1983	$ 5,365,915	$ 1,341,479
1984	$ 4,063,189	$ 1,015,797
1985	$ 209,231	$ 52,308
1986	$ 1,967,240	$ 491,810
1987 2/	$ -2,033,575	$ --
1988	$ 1,232,672	$ 308,168

Source: ANILCA 706(a) Draft 1988 Supply and Demand Report Number 8

1/ Capital investments such as permanent roads, bridges, log transfer facilities, and timber stand improvements also contribute to the total assets of the Tongass National Forest, reduce future management costs, and are scheduled to achieve management objectives described in the Tongass Land Management Plan.
2/ Tongass receipts for fiscal year 1987 were negative as a result to Comptroller General Decision B-224730 of March 31, 1987 to retroactively implement the emergency rate redeterminations for short-term sales. Without the reduction, Tongass receipts would have been positive by $2,139,943. As a result of the negative receipt, no payments to the State were made in 1987.

Commercial Fishing

Although the commercial fisheries industry in Southeast Alaska continues to fluctuate, it remains a major component of Southeast's economy. Salmon stocks recovered from their disasterously low levels in the early 1970's. Salmon continues to dominate the industry, both in the volume and value of catch, and in harvest-related employment. The labor force and employment associated with fishing is highly seasonal.

Table 3-6 shows that fish harvest employment, particularly in the salmon fishery, remained relatively stable between 1979 and 1984, largely because Alaska's commercial fisheries have become increasingly regulated. In the case of salmon, a permit system regulates the number of harvesters accessing the fishery, or, in the case of halibut, harvest is regulated through limited openings or seasons.

TABLE 3-6
FISH HARVESTING IN SOUTHEAST ALASKA

Volume	Ex-Vessel Value	Average Annual	
Year	(1000 lbs.)	(1000 '86 $)	Employment
Salmon Fishery			
1979	71,269	90,291	1,561
1980	90,822	76,855	1,559
1981	108,527	83,126	1,427
1982	119,492	74,869	1,553
1983	150,894	56,158	1,372
1984	145,601	82,361	1,496
1985	NA	NA	NA
1986	NA	NA	NA
All Other Fisheries			
1979	40,427	50,788	681
1980	32,427	20,341	545
1981	40,382	26,965	539
1982	44,085	35,195	618
1983	44,008	34,784	754
1984	42,250	28,720	900
1985	NA	NA	NA
1986	NA	NA	NA

Source: Alaska Seafood Industry Employment 1977-1984, Alaska Department of Labor, Research and Analysis Section, June 1987. Real Dollars have been converted to 1986 dollars using the GNP Implicit Price Deflator.

Seafood processing, also a vital component of Southeast's economy, has undergone some changes since 1980. Of major significance were an increased use of floating fish processing facilities, and a trend toward frozen rather than canned salmon.

Tourism and Recreation

During the 1980's, tourism became a major industry in Southeast Alaska. Cruiseships traveled the Inside Passage making regular stops at Southeast ports in record numbers. Between 1980 and 1986, cruiseship passenger numbers increased by nearly 90 percent. Total visitors to Southeast Alaska grew from 205,000 in 1983 to 350,000 in 1986 (see Table 3-7). The tourist season also expanded to include much of May and September. Its economic significance is likely to increase.

Marketing studies by the Alaska Division of Tourism indicate that "scenery, forest, mountains, out-of-doors" and "wilderness, unspoiled, rugged" were the top interests appealing to potential visitors (Bright 1985). Resident recreation also increased during the 1980's as indicated by fishing and hunting license sales.

Unlike other industries, the tourism and recreation "industry" is not a single industry, but a composite of many that serve more than tourists. For example, retail trade, service, and transportation serve tourists as well as local industries and residents. The labor force and employment associated with tourism and recreation are different than manufacturing. The jobs tend to be highly seasonal and not well paying.

TABLE 3-7
RECREATION AND TOURISM FOR SOUTHEAST ALASKA

	Southeast Cruiseship Passenger #'s 1/	Southeast Ferry System Use 2/	Airline Departure Juneau 3/	Southeast Alaska Visitor #'s 4/
1975	46,279	230,000	110,660	102,500
1980	86,815	276,000	155,699	NA
1981	83,566	282,000	156,257	NA
1982	87,358	300,000	150,871	NA
1983	99,706	308,000	167,302	205,000
1984	118,781	311,000	168,685	NA
1985	137,005	313,000	163,837	NA
1986	164,400	NA	156,667	350,000

1/ From U.S. Customs Data as collected by McDowell Group, Juneau, Alaska.
2/ From Doug Burton, Alaska Marine Highway Program - Traffic Division (465-3946), Annual Traffic Reports - "Traffic Volumes by Port" Represents Boarding Passenger numbers.
3/ From Juneau Airport Manager's Office (789-7821). Represents departing passenger numbers. Only a fraction are tourists. Included as an indication of visitation - business or pleasure - to Southeast Alaska.
4/ From Neil Hagadorn, RO Recreation Management via personal communication with Division of Tourism.

COMMUNITY PROFILES

Thus far in our summary of the socioeconomic overview we have been dealing with an overview of Southeast Alaska's economy. This portion will deal with the structure and characteristics of the communities in Southeast Alaska. This is not an exhaustive list of communities: communities listed are those visited by the Tongass Resource Cooperative Survey (TRUCS) of 1987 with the addition of Juneau, Sitka, and Ketchikan. The communities discussed are listed in alphabetical order. Much of the information for this section comes from the Tongass Resource Use Cooperative Survey (TRUCS) 1987.

Angoon

Angoon, located on the west coast of Admiralty Island at the mouth of Kootznahoo Inlet began as a winter village for the Tlingit Indians. Industry first developed with establishment of a whaling station at nearby Killisnoo, but the whaling industry did not last long. The company then switched to herring processing, but eventually went bankrupt in 1885. Another processing plant followed and prospered, until it was closed in 1930.

Presently, the only community on Admiralty Island, Angoon, has a population of approximately 450. Angoon remains a traditional Tlingit Indian Village with 77 percent of the population being native. Traditional Tlingit customs are more prevalent here than in other Southeast communities. Commercial fishing is a major source of income for Angoon, and many residents are commercial hand trollers. Due to competition from larger fishing boats, a shortened season, and closure of some areas, fishing does not provide a strong economic base for the community.

The major sectors of Angoon's economy are educational services, fisheries, construction, and retail trade. Employment in all sectors of Angoon's economy are highly seasonal. Unemployment in Angoon is high throughout the year. Problems associated with high unemployment are compounded by the high cost of

living. Subsistence hunting and fishing are a vital source of food in Angoon as well as being an important part of the lifestyle and culture. Average per capita yearly income for Angoon is $6,000 (TRUCS 1987).

Craig

Located on a tiny island connected to Prince of Wales Island by a causeway. Craig's population is 1,200 (1987). First used by Tlingit Indians for fishing camps and seasonal villages, the community developed with the commercial fishing industry. A saltery was built in 1907; a cold storage plant in 1908. Craig expanded and declined with fluctuations in the fishing industry. In recent years, the population has been rising due to improved transportation, revitalization of the cold storage plant, construction of a sawmill, and expanded moorage facilities. Alaska Natives account for 28 percent of the population (TRUCS 1987).

The major sectors of Craig's economy are retail trade, fishing, and timber products. Employment is seasonal in fishing, timber, retail, and construction sectors. Craig's average per capita income is $12,000 (TRUCS 1987).

Edna Bay

Edna Bay is located on SE Kosciusco Island, west of Prince of Wales Island, north of Sea Otter Sound. In 1986, its population was 79. Edna Bay has no Alaska Native population. Originally, Tlingit Indians from West Prince of Wales Island used Edna Bay on a seasonal basis. In 1943, a logging camp was established when the demand for aircraft-quality spruce was high. Logging facilities included housing, a few roads and a log transport site. When the last workers left the camp, all buildings were burned. In 1977, the State selected Tongass National Forest land at Edna Bay, with the U.S. Forest Service reserving two administrative sites. In 1982, the State sold several lots around the Bay to private landowners; since then, many permanent homes have been built.

TRUCS (1987) lists the following sectors for Edna Bay's economy: Fisheries, education services, construction, business and repair services. Employment in all these sectors is highly seasonal. The average per capita income for Edna Bay is $3,000 - the lowest reported per capita income in Southeast Alaska (TRUCS 1987).

Elfin Cove

Located on northwest Chichagof Island, Elfin Cove is a small troller town with 20 residents (1984). The first permanent operations at the Cove were in 1927, when a fish buyer established a business there. Although the year-round population is small, Elfin Cove is filled with activity during the fishing season. Many Pacific Northwest fishing vessels use the cove during the summer months. A fish buyer, store, and restaurant operate seasonally. Elfin Cove is still a base for fishing in the Icy Straits area. In 1984, seven percent of the population was Alaska Native; by 1987, the Tongass Resource Use Cooperative Survey reported no Alaska Native population.

Principal economic sectors of Elfin Cove's economy include fisheries, educational services, and transportation, communications, and utilities. Employment is highly seasonal in all sectors. The average per capita income of Elfin Cove is $8,000 per year, one of the lowest in Southeast Alaska (TRUCS 1987).

Gustavus

Gustavus is located in northern Southeast Alaska on the north shore of Icy Straits east of the entrance to Glacier Bay, its population is 218. Five percent of the population is Alaska Native (TRUCS 1987). At the turn of the century, a group of agricultural homesteaders established Gustavus. They supplied meat and produce to Juneau until the 1950's. World War II brought development to Gustavus

in the form of an airstrip and FAA communications facilities. Nearby Glacier Bay National Park was established in 1937. In recent years, Gustavus has developed primarily as a fishing and agricultural community and as the main air access point for the National Park.

TRUCS (1987) found fisheries, entertainment, recreation and tourist services, and transportation, communications and utilities to be Gustavus's principal economic sectors. Gustavus's economy is highly seasonal in all sectors. The average per capita income for Gustavus residents in 1987 was $12,800; one of the highest in Southeast Alaska (TRUCS 1987).

Haines

Haines is located in the northern portion of southeast Alaska near north end of Lynn Canal on the Chilkat Peninsula. The population of the city is 1,154; the outer Haines area is home to 684 people. Alaska Natives comprise 9 percent of the Haines area population (TRUCS 1987).

Originally the Haines area was settled by the Chilkat Tlingits. These Natives are now divided into two groups: the Chilkats of the Chilkat River, with Klukwan being the major population center, and the Chilkoots living in and near Haines. Haines itself was a trade center and mission site. The Haines lumber mill, which had been closed, reopened in November 1988. The new mill, called Chilkoot Lumber, currently employs 100 workers and produces chips, cants, and dimensional lumber. Presently, most of the timber for this mill comes from the Stikine Area of the Tongass.

Haines' principal economic sectors are retail trade, construction, fisheries, and business and repair services. Its economy is highly seasonal in the retail, fishing, forestry, construction, and tourism sectors. Haines' average per capita income is $12,500; one of the higher per capita incomes in Southeast Alaska (TRUCS 1987).

Hoonah

Hoonah is located along Icy Strait on the northeast shore of Chichagof Island along Icy Strait. Hoonah is the principal Tlingit village for the Glacier Bay/Icy Straits areas. Fifty-five percent of its population of 960 (TRUCS 1987) are Alaska Natives.

Tlingit Indians of the Glacier Bay area were forced from their homes by the last glacial advance. One group settled near the mouth of Port Frederick and established Hoonah. They were primarily a hunting people and lived off the varied resources of the area. Commercial fishing began with the development of canneries near Hoonah in the early 1900's. Recently, Hoonah has become the center of logging activities on north Chichagof Island, and a logging camp has been constructed nearby. Logging is taking place on National Forest System Lands as well as land owned by the Huna Totem Corporation, the ANCSA village corporation. A religious farming community has been established at Game Creek, just south of Hoonah.

Hoonah's principal economic sectors are fish and fish processing, retail trade, and forestry. Its economy is highly seasonal in all sectors. The average per capita income of Hoonah is $9,000 per year (TRUCS 1987). Subsistence is a part of many residents' lifestyles and cultural heritage. Most families rely on traditional food gathering for a substantial part of their diets (Alaska Department of Community and Regional Affairs, 1983). Hoonah has suffered housing shortages due to problems with land status.

Hydaburg

Located on the southwest side of Prince of Wales Island, Hydaburg has a population of 444 (1985). Eighty-six percent of this population is Alaska Native (TRUCS 1987).

During the seventeenth century, Haida Indians left the Queen Charlotte Islands and eventually settled in southern Prince of Wales Island. By 1910, there were three Haida population centers on Prince of Wales Island. In 1911 these villages combined to form Hydaburg. Hydaburg has developed as a fishing community. Its economy has fluctuated according to the economic conditions for the area. Seafood processing was active from 1938 until 1982, when a fire destroyed the cannery. A new seafood processing plant was built and is expected to result in future economic and population growth.

TRUCS (1987) lists the major sectors of Hydaburg's economy as fisheries, forestry, and educational services. Employment is highly seasonal in all these sectors. The average per capita income for Hydaburg is $7,000 (TRUCS 1987).

Hyder

Located in south portion of Southeast Alaska, Hyder is at the northern end of Portland Canal on the fringe of the Misty Fiords National Monument, less than 2 miles from the town of Stewart, British Columbia. In 1984, one percent of the population of 79 was Alaska Native. By 1987, the TRUCS study reported no Alaska Natives.

Hyder began as a mining town before the turn of the century. It developed as a supply point for the Canadian mining district with a small amount of mining also done in the Hyder area. Most mining ended in the late 1950's. Today, tourism is the town's main industry.

Hyder's main economic sectors are retail trade, construction, transportation, communications, and utilities. Employment is highly seasonal. The average per capita income for Hyder is $6,000 (TRUCS 1987).

Juneau and Vicinity

The City and Borough of Juneau are located surrounding the Gastineau Channel. The City and Borough are comprised of three communities: Juneau, Auke Bay, and Douglas. Population in 1987 was 23,799, with 11 percent of this population being Alaska Native (ADF&G Community Profiles, 1987).

Originally, Tlingit Indians made seasonal and permanent villages along the north and south coast near the present site of Juneau. Gold discovered in the Juneau area started the mining town in 1880 and the settlement grew rapidly. Two of the world's largest lode gold mines produced over $180 million in gold before finally closing in 1944. Juneau has developed as a government and regional services center, with added economic contributions from fishing and tourism.

Juneau's economy is overwhelmingly supported by government and administration (ADF&G Community Profiles, 1987). Other major sectors include fishing and tourism; minor economic sectors include retail trade, education services, other professional services, construction, and transportation. Mining again may play an important role due to the new interest in old, previously worked, deposits.

Kake

Located on west Kupreanof Island, Kake has a population of 618 people, 67 percent of whom are Alaska Native (TRUCS 1987).

Tlingit Indians built villages and fishing camps in the Kake area which were consolidated in the late 1800's. Since then, the community has developed an

economy based largely on the commercial fishing industry. A school and store were built in 1891; a cannery in 1912. A cold storage, built in 1980, is still in operation. Logging began in the 1940's and continues to provide some employment opportunities for Kake residents. Most of the logging in recent years has taken place on lands owned by the Village Native Corporation. In the early 1980's Kake experience a severe housing shortage.

Kake's major economic sectors are fishing and fish processing, and transportation, communications, and education services. Employment is highly seasonal. Much of Kake's population depends on subsistence fishing and hunting. Kake's average per capita income is $9,000 (TRUCS 1987).

Kasaan

The eastern side of Prince of Wales Island is the location of Kasaan. Forty-eight percent of its population of 70 are Alaska Natives (TRUCS 1987).

The Haida village of Kasaan was settled at its present site around 1900. The original village had been located seven miles from this site. A sawmill and school were built in 1892, with a post office being built in 1900. Canneries were the major industry with canneries operating intermittently from 1901 to 1953.

TRUCS (1987) lists the following economic sectors for Kasaan: fisheries, educational services, and local government. Employment in the fishing and school sectors are highly seasonal. The average yearly per capita income is $8,900 (TRUCS 1987).

Ketchikan

Revillagigedo Island is the location of Ketchikan. Ketchikan and vicinity include Ketchikan, Saxman, Mountain Point, Clover Pass, Ward Cove, and Herring Cove which are located on the Ketchikan road system, and Pennock Island. The population of Ketchikan and vicinity is 12,705. Native populations vary from a high of 71 percent in Saxman to a low of less than 8 percent in the Ketchikan suburbs. Ketchikan itself has a native population of 15 percent.

The Ketchikan area was a summer fishing camp for the Tlingit Indians. Development began with a saltery at the mouth of Ketchikan Creek. Ketchikan was a boom town in the late 1800's. Since the early 1900's, timber products have been a important economic influence in Ketchikan. In 1954, a world-scale pulp mill was built in Ward Cove. Due to its location as a transportation center, fishing center, and focus for the subregion's timber industry, Ketchikan grew rapidly in the 1950's. Recently, mining has grown in economic importance, along with government, tourism, and services.

ADF&G Community Profiles (1987) listed the following sectors for Ketchikan's economy: Crafts, operators and laborers, professional and technical, service, clerical, sales, agricultural and forestry. Employment in the fishing industry tends to be seasonal. The economy, in general, is diverse enough to provide stability in the professional, technical, and service sectors. Average per capita income information was not available for Ketchikan.

Klawock

Prince of Wales Island is the location of Klawock. Population 592. Sixty-six percent of the population is Alaska Native.

Tlingit Indians have lived in the same area, near the Klawock River for at least 600 years. Present-day growth and development of Klawock began with commercial fisheries, and with the first salmon saltery in southeast Alaska. Two additional

canneries were built in 1920 and 1924 and an associated sawmill. One cannery continues to operate in Klawock. In 1971, a major sawmill was constructed that operated sporadically. With harvest of Native corporation lands in the vicinity of Klawock, Klawock-Heenya, the ANCSA village corporation, constructed docking and log transfer facilities near the city. Klawock is now the center of the Tlingit population on West Prince of Wales Island.

TRUCS (1987) found that retail trade, educational services, forestry and fishing were the major economic sectors of Klawock. Employment is highly seasonal in all these sectors. Klawock's average per capita yearly income is $8,500 (TRUCS 1987).

Klukwan

Located in northern Southeast Alaska, northwest of Haines on the Chilkat River, Klukwan has a population of 171. Alaska Natives comprise 82 percent of this population (TRUCS 1987)

Because of its location in the Chilkat River Valley, Klukwan, a Chilkat Indian village, has had a long history as a trade center. With the Gold Rush of the late 1800's, the Chilkat Valley was used as a supply route to Dawson in the Yukon. Since then, little development has taken place. The Alaska Chilkat Bald Eagle Preserve was recently established adjacent to the community.

Klukwan's principal economic sectors include transportation, communications and utilities, Native Corporations, health and social services, and communications (TRUCS 1987). All employment is seasonal. The average per capita yearly income for Klukwan is $6,000, one of the lowest in Southeast Alaska.

Kupreanof

With a population of 51, Kupreanof is located on East Kupreanof Island, directly across Wrangell Narrows from Petersburg. Four percent of the population is Alaska Native.

Around the turn of the century, and at about the same time Petersburg was settled, a settlement was started at Kupreanof. The first business was a sawmill that produced barrels for salted fish shipped from Petersburg. In the 1920's a fur farm (fox and mink) started and lasted until the 1960's. Various businesses related to the fishing industry and to the economy of Petersburg grew in the 1930's and 1940's. The population dropped in the 1950's to a low of 26 in 1960. Since then, interest in the slower pace of life led to a renewed interest in the community. In 1975, Kupreanof was successfully incorporated by its residents. Many residents depend on the commercial fishing industry; some engage in various trades for their livelihoods, and most are self employed.

Kupreanof's principal economic sector is fishing (SOURCE?) Employment is highly seasonal. No per capita income figures were available for Kupreanof.

Metlakatla

Annette Island in southern Southeast Alaska is the location of Metlakatla. Seventy-three percent of the population of 1,089 is Alaska Native (TRUCS 1987).

In 1887, a minister of the Church of England and his Tsimshian followers moved from British Columbia in search of religious freedom. They settled in Metlakatla. In 1891, Congress declared Annette Island an Indian Reservation. The community of Metlakatla has prospered largely due to its self-sufficient nature and successful involvement in the commercial fishing and timber industries. The island was used for a brief time as a Coast Guard base and a

regional airport. Today, a sawmill, fish hatchery, and cannery provide a substantial economic base.

The same percentage of Metlakatla's population are employed in wood processing and fish processing industries. Commercial fishing and educational services are the other major economic sectors of Metlakatla's economy. Although employment in Metlakatla is seasonal in all sectors, it is not highly seasonal. Metlakatla's yearly per capita income is $8,600 (TRUCS 1987).

Meyers Chuck

Located 40 miles northwest of Ketchikan on Clarence Strait, on the tip of the Cleveland Peninsula is Meyer's Chuck, population 52.

Beginning as a protected anchorage for fishing vessels, Meyers Chuck developed into a permanent community with the building of a cannery (turn of the century). Postal service began in 1922. Fishing and fish processing, and support services sustained the community until the mid-1900's. Low fish runs and World War II caused most of the population to move away. Recently, the population has begun to grow with fishers, retirees, and a few vacationers.

Education services is the main economic sector of Meyer's Chuck, followed by fisheries, transportation, communications, and utilities, and retail trade. All employment is highly seasonal in nature. The average yearly per capita income of Meyer's Chuck is $4,000, one of the lowest in Southeast Alaska (TRUCS 1987).

Pelican

Pelican is a fishing village along Lisianski Inlet on the northwest corner of Chichagof Island. Part of the community is built on pilings over the tideland. A boardwalk serves as the town's main thoroughfare. Pelican boasts a population of 206 with the Alaska Native component of the population at 21 percent (TRUCS 1987).

It is believed the west Chichagof area was used by Hoonah and Sitka Tlingit Indians for fishing camps and temporary villages. Settlement in Pelican probably began with mines and fox farms. Canneries began in the area to service the developing commercial fishing industry. Pelican was founded in 1938 by a fisherman who set up a fish buying operation and, eventually, a cold storage at the site. Following initial construction of the community, a school and post office were built. Growth since then has been slow, and linked entirely to the commercial fishing industry. A present-day cold storage provides employment. Some timber harvesting has also taken place in the Pelican area.

Fisheries and fish processing employ the majority of the population of Pelican. Educational services is the other economic sector. Although Pelican Cold Storage is a year-round employer, other employment in Pelican is highly seasonal. The average per capita income for Pelican is $11,000 (TRUCS 1987).

Pelican is not recognized under the Alaska Native Claims Settlement Act as a Native Village, therefore, it has little room to grow.

Petersburg

With a population of 3,137, Petersburg is located on the northern tip of Mitkof Island in east-central southeast Alaska. Eleven percent of Petersburg's population is Alaska Native.

Founded by Norwegian, Peter Buschmann in 1899, and became an incorporated community in 1906. More Norwegians followed and settled a Scandinavian-style community. Petersburg grew around a cannery, and the site quickly became a

center for fishing, fish processing, and transportation. A sawmill was added, as were a packing house and docks. Continual growth has occurred in Petersburg through the years except for a slight decline in the 1950's. Today, Petersburg is an active community with fishing, fish processing, and timber being its predominant industries. Tourism has become an increasing source of revenue during the summer months.

Petersburg's main economic sector is seafood processing and manufacturing with the various governments being the second largest employer. Retail trade and construction make up the other economic sectors. Employment is seasonal in the manufacturing, retail, and construction sectors. No information was available on Petersburg's per capita incomes.

Point Baker
Port Protection

Separated by 2 miles of water, these communities are located on the north tip of Prince of Wales Island. The combined population of both communities is 93 people, of which 6 percent are Alaska Native (TRUCS 1987). Both communities are similar in history, economy, and use of local resources.

Captain George Vancouver, an early explorer, mapped and named this protected harbor in the late 1700's. The first floating fish packer came to Point Baker to buy fish in 1919 and trade continued until the 1930's. The actual community of Point Baker was not settled until the 1930's when the Forest Service opened the area for homesites.

Port Protection was founded by a man name Johnson when he took refuge in the cove after he had lost a wooden wheel off his boat. Johnson later built a store and a fuel dock and this area became a popular place for trollers to stop enroute to other destinations.

Both economies peak with summer and fall fishing. Most residents own fishing boats and choose to live here for the independent and subsistence lifestyle the area offers. The communities share a post office, store, and a fish and game advisory committee. They have been affected in recent years by logging activities in areas adjacent to them, and the development of a logging camp in nearby Labouchere Bay.

The main economic sector for Point Baker and Port Protection is fishing, followed by retail trade, construction, and education services. Employment is highly seasonal in all sectors. The per capita incomes for both communities is about $6,000 (TRUCS 1987).

Port Alexander

Port Alexander (Population 162) is located on the south end of Baranof Island on the west side of Chatham Strait. Five percent of the population of Port Alexander is Alaska Native (TRUCS 1987).

With a protected harbor, Port Alexander attracted fishing boats as early as the 1920's. The community was settled by trollers who fished the Chatham Strait fishing grounds and prospered until the late 1930's. Land-based businesses developed along with the fishing industry. The last 20 years have brought a slow, steady increase in numbers of residents. People choose Port Alexander as a home because of its independence, subsistence lifestyle, and commercial fishing opportunities as well as its remote setting. There are no roads in Port Alexander; travel within the community is by skiff, boardwalks, and footpaths.

Fisheries employ almost three quarters of the residents of Port Alexander. The other major economic sectors are educational services and local government. All economic sectors except government are highly seasonal. The average per capita income for Port Alexander is $6,000 (TRUCS 1987).

Saxman

Saxman is located on west Revillagigedo Island, south of Ketchikan on the Tongass Highway. In 1985, Saxman's population was 301; 79 percent of that population were Alaska Natives (TRUCS 1987).

Tlingit Indians from the villages of Cape Fox and Tongass chose Saxman as their permanent home in 1894. Fishing and milling timber for themselves and the growing community of Ketchikan were its economic mainstays.

In the late 1930's artifacts and totem poles were retrieved from the original Cape Fox and Tongass village sites and placed in a totem park in Saxman. This park is now a major cultural and tourist attraction.

Being near Ketchikan, Saxman did not develop an independent economy until recently. Although Saxman residents still depend on Ketchikan for most services and employment opportunities, development of a barge terminal, a fishing fleet, and the Cape Fox Village Corporation investments have led to some recent growth in Saxman's population and economic base.

The major economic sector of Saxman is local government, followed by social and health services, retail trade, and fisheries. Saxman's economy is seasonal in all sectors except government. The average per capita income for Saxman residents in 1987 was about $7,000 (TRUCS 1987)

Sitka

Located on the west side of Baranof Island, Sitka (Population 8,160) is the only community is Southeast Alaska which fronts the open sea. Eighteen percent of Sitka's population is Alaska Native. Present day Sitka, contains a separate Indian Village within the community.

Originally settled by the Tlingit people, it became the focal point of Russian fur trade in North America beginning in 1741. Russian hunting of the sea otter continued for over 50 years, and almost decimated the resource. With the demise of the fur industry in the 1860's, Russia lost interest in her North American colony.

After fur trade, fishing and fish processing dominated Sitka's economy for a time. Currently Sitka's economy is based on pulp manufacture, tourism, education, commercial fishing and services, and local state, and federal government.

Nearly equal numbers of people are employed in health and social services, retail trade, and educational services with smaller numbers being employed in fisheries and wood processing. Sitka's economy is seasonal in the manufacturing and construction sectors. Sitka's average per capita income is $14,500, the highest of communities surveyed by the Tongass Resource Use Cooperative Survey in Southeast Alaska.

Skagway

Founded in 1896 at the tip of Taiya Inlet at the extreme North end of Lynn Canal, is the town of Skagway. More than 20,000 gold seekers traveled through Skagway on their way to the Klondike Gold Fields. Many miners who arrived in the late

fall actually overwintered in Skagway before starting their journeys in search of gold. With the (ebbing) of the Gold Rush, Skagway's population dwindled.

Today, Skagway boasts 500 year-round residents. Formerly the shipping center for zinc and copper from the Yukon, the present mainstay of Skagway's economy is tourism. Approximately 145,000 tourists visit Skagway each year.

Major employment sectors of Skagway are retail trade, entertainment, recreation, and tourist services, and transportation, communications and utilities. Skagway's economy is highly seasonal in all sectors. The average per capita income of Skagway is $12,000 (TRUCS 1987).

Tenakee Springs

With a population of 142 residents, Tenakee Springs is located 50 miles northeast of Sitka on the North shore of Tenakee Inlet (east Chichagof Island). Access to Tenakee is by floatplane or the Alaska Marine Highway.

Historically, Tenakee Springs was a favorite wintering spot for early prospectors and miners. Today, many Tenakee Springs residents are retired and younger families are moving in, attracted by the slower pace of life and opportunities for a subsistence lifestyle. It has the highest percentage of senior citizens of any community in Alaska.

Tenakee is popular with area people and a favorite stop for boaters. A number of Juneau residents maintain second homes there. Logging began at nearby Corner Bay and along the Indian River Road in the early 1970's and continues intermittently.

The major employers of Tenakee Springs are fisheries, retail trade, and local government with all sectors being highly season except government. The average annual per capita income in Tenakee Springs is $9,000 (TRUCS 1987).

Thorne Bay

Located at the head of Thorne Bay on eastern Prince of Wales Island is the community of Thorne Bay. Built in 1960 to replace a logging camp previously near Hollis, Thorne Bay has grown as a center of timber harvest activity for the east Prince of Wales Island Area. Since 1960, over 700 miles of road have been developed on the Island. These roads now connect Thorne Bay with most other communities on Prince of Wales Island. State land sales, municipal government, and the development of new economic sectors have led to its present status as a permanent community, although its economy is still tied to the timber industry. The present population of Thorne Bay is 475. Less than one percent of the population is Alaska Native.

Forestry and wood processing employ the major amount of Thorne Bay's populations with the other major employer being retail trade. Over 80 percent of the population remains in the community year round. The average per capita income of Thorne Bay is $11,000 (TRUCS 1987).

Wrangell

Originally inhabited by Tlingit Indians, Wrangell (population 2300) is located on the northern tip of Wrangell Island near the Stikine River. Eighteen percent of the population is Native Alaskan (TRUCS 1987). This community has flown the flags of three nations, England, Russian, and the United States. The late 19th century saw Wrangell become a supply center for gold miners and prospectors during three gold rushes.

Today, timber and fish and fish processing dominate Wrangell's economy. More than 100 residents fish commercially and for nearly 50 percent of them, its their

major source of income. Tourism is also a growing influence in the area. No information was available on Wrangell's per capita income (Source?).

Yakutat

Yakutat is located on the mainland in extreme northern Southeast Alaska. It's 1988 population was 430 residents; 56 percent of whom are Alaska Native.

Historically, Yakutat began as a Tlingit village site in the mid 1800's and has continued to be an important Native Community. It has developed largely around the commercial fishing industry. Oil exploration caused a brief economic boom in the late 1970's. Recent logging industry developments have increased Yakutat's population and employment. Tourism is an emergent, growing industry in Yakutat, especially since the 80 mile long Hubbard Glacier sealed off the Russell Fiord in 1986. Russell Fiord is no longer sealed off due to the failure of the ice dam blocking its entrance.

The major employers of Yakutat are fisheries, fish processing, and government with retail trade and forestry being the other economic sectors. Most jobs other than governmental jobs are seasonal. The average per capita income for Yakutat is $9,000.

Subsistence is also an important part of Yakutat's economy with many Tlingits who depend upon the fish of the many surrounding rivers for their livelihoods.

AIR QUALITY

OVERVIEW

The State of Alaska Department of Environmental Conservation has the primary responsibility for the attainment and maintenance of ambient air quality standards under the provisions of the Clean Air Act (CAA) (42 U.S.C. 7401 et. seq.).

Management of air quality is done by airsheds, geographical areas that because of topography and climate share the same air mass. The Clean Air Act defines three types of airsheds, based on the degree of protection from future degradation of air quality to be given to each. Class I airsheds are designated for the greatest degree of protection, class II are designated for a moderate degree of protection, and class III are given the least amount of protection.

The Clean Air Act designates as mandatory Class I areas each National Park over 6,000 acres, and each Wilderness area over 5,000 acres that existed as of the date of enactment of the Clean Air Act (August 7, 1977). Wilderness and additions to Wilderness designated since this date are not automatically Class I areas, but can be redesignated as such. At this time four areas in Alaska are classified as Class I airsheds: Denali (Mt. McKinley) National Park, and those portions of the Bearing Sea, Simeonof, and Tuxedni National Wildlife Refuges designated as Wilderness. The remainder of the state is classified into Class II airsheds. Therefore, the entire Tongass National Forest, including the National Monuments and wildernesses, is a Class II airshed.

Effects on air quality from forest management activities are temporary and limited in nature. They result from dust and vehicular emissions from logging operations and public travel on Forest roads, and from smoke from a limited prescribed burning program. Another minor source of air pollution is wind-borne smoke from communities and the two pulp mills in southeast Alaska.

SUPPLY/INVENTORY

EXISTING

Air quality on the Tongass National Forest is rated as pristine. Occasionally during the summer, there may be short, dry periods when human activities on dirt roads, such as vehicle traffic, temporarily lower standards on and adjacent to those roads. Since 1984, a prescribed burn program has been conducted throughout the Forest. There are no known air quality problems caused by this burning program within or adjacent to the Forest.

POTENTIAL

Prescribed burning may increase in the future depending on weather and stand conditions. Because prescribed burn sites are usually remote from population centers, any increase in prescribed burning would have negligible effects on the air quality of these communities. Management of resources will continue to be conducted to assure that predicted emissions do not exceed Alaska Administrative Code ambient air quality standards.

DEMAND ASSESSMENT

The demand for good air quality at present is associated primarily with the concern for safety on dusty log-haul roads. With increased recreation use of the Forest, planning activities must identify air quality as a basic concern and apply mitigation measures to protect air quality.

EXISTING DIRECTION

Existing direction is located in Forest Service Manual (FSM) 2580, Forest Service Handbook (FSH) 2509.19, and the Regional Guide. The following describe the existing policies and guideline direction:

1. The National policy is to:
   a. Integrate air resource management objectives into all resource planning and management activities, and
   b. Use cost-effective methods for achieving resource management objectives.

2. The Regional Guide states that smoke management will be coordinated with the Alaska Department of Environmental Conservation to assure that air-quality increments are not exceeded. Local sources of emission will be evaluated to assure that airshed integrity is maintained.

RESULTS OF TLMP IMPLEMENTATION

TLMP predicted that air quality would be affected adversely only during short, dry periods that might occur over the planning period. The expected sources of pollution were experimental slash burning and dust from roads. The impact from these sources is not known. Some dust abatement was done on main haul roads also used by the public. Its effectiveness was not documented. Due to an increase in controlled burns on clearcuts to benefit wildlife, the amount of smoke probably exceeded what was anticipated.

OPPORTUNITIES AND CONCERNS

There is an opportunity to maintain the current, generally pristine, air quality forestwide by managing Forest resource activities to assure that predicted emissions for all point sources, mobile sources, and fugitive dust do not exceed ambient air quality standards as specified under the Alaska Administrative Code.

BIOLOGICAL DIVERSITY

OVERVIEW

The National Forest Management Act (NFMA) defines diversity as the distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan. Biological diversity encompasses the variety of life in an area, including the variety of genes, species; plant and animal communities, ecosystems, and processes through which individual organisms interact with one another and their environments.

DEFINITION

National Forests are ecosystems and their management for goods and services requires an awareness and consideration of the interrelationships among plants, animals, soil, water, air, and other environmental factors within such ecosystems. NFMA provides the following direction for diversity (36 CFR 219.26): "Forest Planning shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple-use objectives of the planning area. Such diversity shall be considered throughout the planning process. Inventories shall include quantitative data making possible the evaluation of diversity in terms of its prior and present condition. For each planning alternative, the interdisciplinary team shall consider how diversity will be affected by various mixes of resource outputs and uses, including proposed management practices."

VIABLE POPULATIONS

Fish and wildlife habitat is to be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For planning purposes, a viable population shall be one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support at least a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area (36 CFR 219.19).

DIVERSITY GOAL

A useful goal for biological diversity is to maintain, in a healthy state, both species (plant and animal) and the ecological processes historically native to a particular landscape. Diversity is not a numbers game--whether that be maximization of species number or maximizing populations of economically important game populations, rather it is an emphasis on populations and processes historically native to an area. The biological diversity goal for the Tongass National Forest is to maintain the viability of native and desirable non-native plant and animal species and communities; to maintain the distribution of plant and animal species and communities; and to maintain the ecological processes upon which the plant and animal species and communities depend.

DIVERSITY ELEMENTS

Discussing and displaying biological diversity for the diverse publics interested in management of National Forests can be a difficult task. To accomplish this task, and to display qualitatively and quantitatively biological diversity in the Forest planning process, eight elements of biological diversity have been developed (Figure 3-5)(Orme et al. 1989). These eight elements provide the opportunity to describe ecological processes and to account for changes in biological diversity with various resource management alternatives.

FIGURE 3-5
EIGHT ELEMENTS OF BIOLOGICAL DIVERSITY

```
        ECOLOGICAL PROCESSES
                 |
                 |
                 v
  PLANT ASSOCIATIONS AND COMMUNITIES
                 |
                 |
                 v
TOTAL NUMBER OF PLANT & VERTEBRATE SPECIES
                 |
                 |
                 v
  SPECIES EXTINCTIONS AND INTRODUCTIONS
                 |
                 |
                 v
   SPECIES ABUNDANCE & DISTRIBUTIONS
                 |
                 |
                 v
     MANAGEMENT INDICATOR SPECIES
                 |
                 |
                 v
        HABITAT FRAGMENTATION
                 |
                 |
                 v
        SPECIES VULNERABILITY
```

SUPPLY/INVENTORY

Each of the eight elements will be discussed in this section.

Ecological Processes

Ecological processes create the environmental conditions which shape plant and animal communities present on a National Forest. Significant ecological processes on the Tongass National Forest include:

1) The amount and pattern of rainfall. The Soil and Water Sections in this Chapter of the AMS document rainfall patterns and influences on the Tongass National Forest.

2) The effects of glaciation and time of recession of glaciers. The distribution and age of the natural vegetational communities is the result of glacial advances and recession. The distribution of animal species among the islands and the mainland is also attributed to the effect of glaciers (Klein 1963).

3) The lack of natural fire. Fire has not been a major factor in shaping the vegetative conditions on the Tongass. The section on Fire in the Resource Environment Section of Chapter 3 in the AMS documents the fire history of the Forest.

4) The influence of wind. Wind has been a widespread natural disturbance factor shaping forested vegetation on the Tongass. Wind effects can be placed in two categories: a) Wind is a constant "small scale" disturbance force throughout most of the Forest, wherein individual trees or small groups of trees are blown over, which creates small openings in forest stands. b) Wind is a "large scale" disturbance force at specific times and places, wherein large blocks of trees (hundreds of acres in size) can be blown down in violent localized wind storms.

5) Some physical characteristics of Southeast Alaska that combine with ecological processed to create unique environments include: Steepness of slopes, presence of high water tables, soil types and conditions, and elevations. Information on these can be found in the section on Soil in the Resource Environment Section of Chapter 3 in the AMS.

These ecological processes are not independent processes, but rather combine to create the environmental conditions which are the Tongass National Forest. The following brief discussions on the physical and biological setting help illustrate these conditions. Additional more detailed information is found throughout Chapter 3, Affected Environment, of the AMS.

PHYSICAL SETTING.--The mainland and islands of Southeast Alaska are mountainous, often abruptly rising from sea level to several thousand feet. Elevations range from sea level to approximately 3,000 feet in the southern sections of the forest, and from sea level to 2,500 feet further north (Harris et al. 1974).

The configuration of the coastline, the warm Japanese ocean current, and high coastal mountains provide all of the ingredients necessary to produce abundant rainfall. The Tongass National Forest is a temperate rain forest, with annual precipitation averaging more than 80 inches. Precipitation is highest in the southern areas, and decreases as one moves north. At higher elevations, more than 200 inches of snow may fall annually, perpetuating the existing icefields and glaciers. Although storms and moderate to heavy precipitation occur year round, the greatest frequency of storms and heavy precipitation occurs from September through November. The abundant moisture feeds many small streams, rivers, and lakes which dot the landscape.

BIOLOGICAL SETTING.--The coastal forest of Southeast Alaska is part of the cool, very moist temperate rain forest that extends along the Pacific coast from Northern California to Cook Inlet in Alaska. Most of the forest area on the Tongass National Forest is old growth, particularly on islands which were uncovered before the mainland during the most recent glacial advance. These islands provide important habitat for plants and animals, yet rarely in any archipelago are populations of all species found on all islands. Biogeographic factors, including island size and distance to other islands and the mainland,influence a species ability to successfully colonize islands (MacArthur and Wilson 1967). Factors associated with behavior and ecological relationships are also thought to influence distribution of animal species. Examples of this are Admiralty, Baranof, and Chichagof Islands which support brown bear but not black bear (Ursus americanus) populations. Some islands have populations of gray wolves, while others do not, and their presence has an important influence on the distribution and abundance of other species such as Sitka black-tailed deer (Odocoileus hemionus sitkensis) (Van Ballenberghe and Hanley 1984).

The influences or effects of the environmental processes are not uniform throughout Southeast Alaska. Seven different geographic provinces have been described for Southeast Alaska based on differences in the environmental processes (Figure 3.xx)(Juday et al. 1988). These seven geographic provinces are:

1. **Yakutat Forelands.** Includes Glacier Bay north to Yakutat Bay. Recently uplifted beaches and active fluvial processes related to icefields, valley glaciers and cold wet climate distinguish this region from the rest of Southeast Alaska.
2. **Northern Outer Islands.** Rugged highly dissected topography, exposed extremely wet outer coastal environment, and extensive alpine environments with productive forested areas highly fragmented and usually concentrated on oversteepened slopes and on valley bottoms.
3. **Lynn Canal.** The driest and one of the most continental environments in Southeast Alaska. Extreme rain shadow from the Chilkats and St. Elias Range allows extensive development of fire dependent forests (lodgepole and birch), and the southern and westward extension of boreal forest and tundra plant species. Rugged scoured terrain with large vertical relief.
4. **Coast Range.** Rugged heavily glaciated terrain with extensive alpine and icefield environments. Productive forest land usually confined to river valleys and marine terraces. British Columbia batholith has major influence over the shoal area. This province may be logically divided into two subzones, perhaps divided at the Bradfield Canal with more extensive alpine and active glaciation to the north, and less extensive ice to the south.
5. **Central Interior Islands.** Includes Kupreanof Lowlands and surrounding areas protected from storms off the outer coast and generally moderate in precipitation and temperature extremes. Includes several major rain shadow areas such as northwest Kupreanof and parts of Etolin. Generally subdued rolling topography and extensive muskeg areas.
6. **Northern Interior Islands.** Includes eastern Chichagof and Admiralty Islands. Protected from full force of storms off of the outer coast, but with colder climate and more rugged topography than in the Central Interior Islands province. Also, with distinctive fauna. Originally considered a sub-province of the Northern Outer Islands, but because of its contrast in climate and geology with the outer coast and Baranof, it was redefined as its own province.
7. **Southern Outer Islands.** Rolling subdued topography to the north and localized rugged topography to the south. Includes many refugia, unique plant and animal populations at the northern extent of their natural range, and highly productive forests, especially on limestone and marble soils derived from ancient coral reefs.

Plant Associations

The types of plant communities and plant associations present in an area are the result of the ecological processes. The ecological processes in place in Southeast Alaska have created conifer forests which are ecologically unique in North America. Most of these forests are in an old-growth, climax condition. These forests have been classified into one ecological type, seven series, and 57 plant associations (Table 3-8)(Martin 1989).

FIGURE 3-6

SOUTHEAST ALASKA GEOGRAPHIC PROVINCES

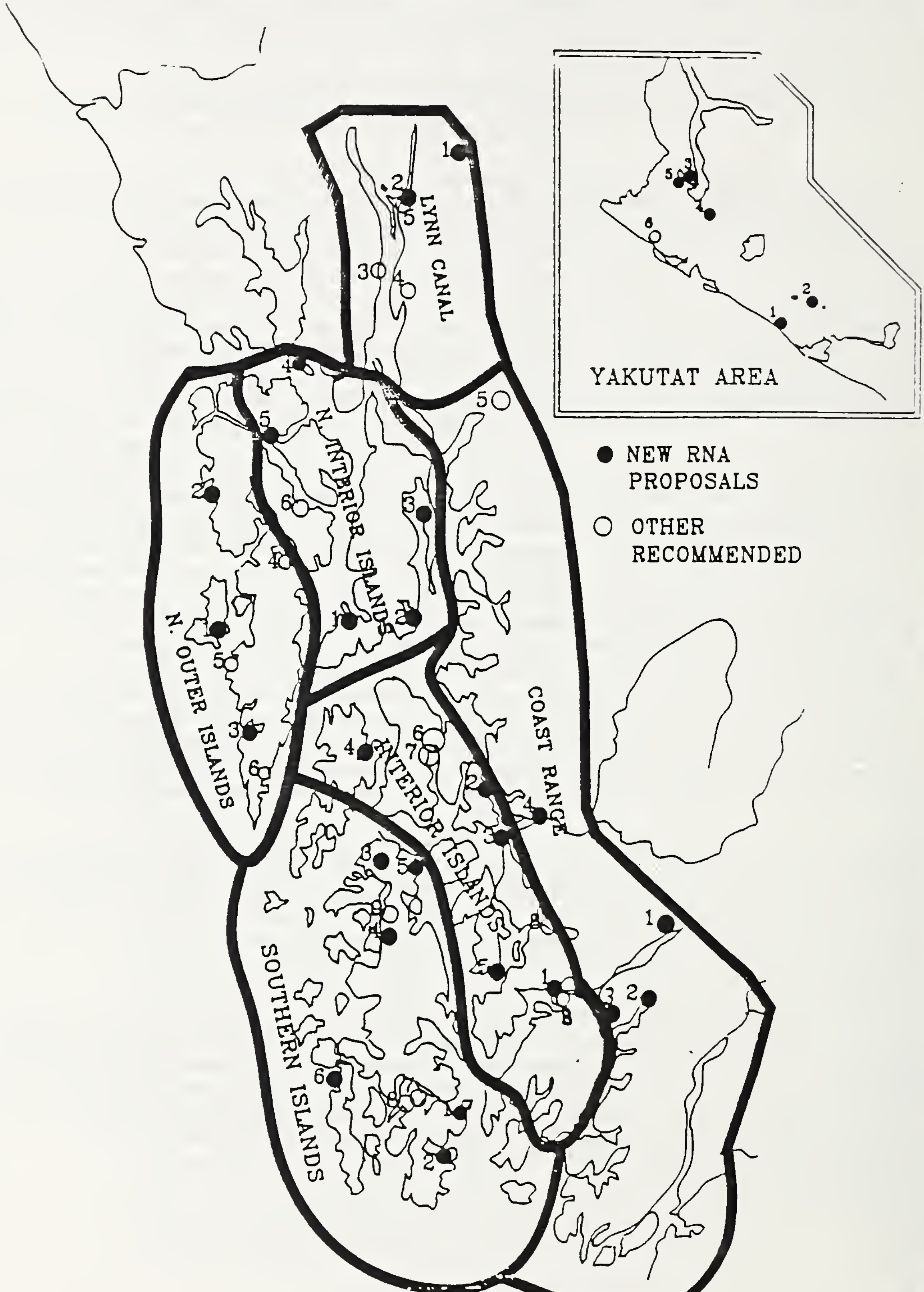


TABLE 3-8
PLANT ASSOCIATIONS AND THEIR DISTRIBUTION ON THE THREE TONGASS ADMINISTRATIVE AREAS.

Series	Plant Association Number and Common Name		Distribution by Administrative Area Chatham	Ketchikan	Stikine
Western Hemlock	110	Western Hemlock/Blueberry	X	X	X
	120	Western Hemlock/Blueberry/Spinulose Shield Fern	X	X	X
	130	Western Hemlock/Blueberry/Skunk Cabbage	X	X	X
	140	Western Hemlock/Blueberry-Devil's Club	X	X	X
	150	Western Hemlock/Blueberry-Devil's Club-Shallow Soils	X		
	155	Western Hemlock/Devil's Club-Salmonberry		X	
	160	Western Hemlock/Devil's Club	X		X
	170	Western Hemlock/Devil's Club/Skunk Cabbage	X		
Western Hemlock-Alaska Cedar (WH-AC)	210	WH-AC/Blueberry	X	X	X
	220	WH-AC/Blueberry/Skunk Cabbage	X	X	X
	230	WH-AC/Blueberry-Rusty Menziesia	X		
	250	WH-AC/Blueberry-Devil's Club	X	X	
Sitka Spruce	310	Sitka Spruce/Blueberry	X	X	X
	320	Sitka Spruce/Blueberry-Devil's Club	X	X	X
	330	Sitka Spruce/Devil's Club	X	X	X
	335	Sitka Spruce/Devil's Club-Salmonberry	X	X	
	340	Sitka Spruce/Devil's Club/Skunk Cabbage	X	X	X
	345	Sitka Spruce/Devil's Club-Upland	X		
	350	Sitka Spruce/Alder	X	X	X
	351	Sitka Spruce/Alder-Devil's Club			X
	352	Sitka Spruce/Red Alder	X	X	X
	353	Sitka Spruce/Sitka Alder	X		
	355	Sitka Spruce/Devil's Club/Enchanter's Nightshade			X
	360	Sitka Spruce/Pacific Reedgrass	X	X	
	370	Sitka Spruce/Blueberry/Skunk Cabbage	X	X	X
	380	Sitka Spruce/Salmonberry		X	
	395	Sitka Spruce-Mountain Hemlock/Blueberry-Devil's Club			X
Mixed Conifer	410	Mixed Conifer/Blueberry	X	X	X
	420	Mixed Conifer/Blueberry/Skunk Cabbage	X	X	X
	430	Mixed Conifer/Blueberry/Deer Cabbage	X	X	X
	440	Mixed Conifer/Skunk Cabbage-Lady Fern	X		
	460	Mixed Conifer/Blueberry-Salal		X	X
	470	Mixed Conifer/Salal/Skunk Cabbage			X
	480	Mixed Conifer/Salal		X	
	490	Mixed Conifer/Copperbush	X		
Mountain Hemlock	510	Mountain Hemlock/Blueberry	X	X	X
	511	Mountain Hemlock-Sitka Spruce/Blueberry	X		
	515	Mountain Hemlock/Blueberry-Low Elevation		X	
	520	Mountain Hemlock/Copper Bush-Cassiope	X		
	530	Mountain Hemlock/Cassiope	X	X	X
	540	Mountain Hemlock/Blueberry-Copper Bush/Deer Cabbage		X	X
	550	Mountain Hemlock-Alaska Cedar/Blueberry		X	
	560	Mountain Hemlock-Alaska Cedar/Blueberry-Copper Bush/Deer Cabbage		X	
	570	Mountain Hemlock/Blueberry/Marsh Marigold			X

TABLE 3-8 (Continued)
PLANT ASSOCIATIONS AND THEIR DISTRIBUTION ON THE THREE TONGASS ADMINISTRATIVE AREAS.

Series	Plant Association Number and Common Name		Distribution by Administrative Area Chatham	Ketchikan	Stikine
	580	Mountain Hemlock/Blueberry/Skunk Cabbage			X
	NO #	Mountain Hemlock/Blueberry/Deer Cabbage	X		
Shorepine	610	Shorepine/Crowberry	X	X	X
	620	Shorepine/Blueberry			X
	630	Shorepine/Tall Sedge	X		
	630	Shorepine/Sitka Sedge			X
Western Hemlock-Red Cedar					
(WH-RC)	710	WH-RC/Blueberry		X	X
	720	WH-RC/Sword Fern		X	
	730	WH-RC/Blueberry/Skunk Cabbage		X	X
	750	WH-RC/Blueberry-Well Drained		X	
	760	WH-RC/Blueberry-Salal		X	
	765	WH-RC/Blueberry-Salal/Skunk Cabbage		X	
	780	WH-RC/Salal		X	

Source: November 16, 1989 Listing of Plant Associations by Jon R. Martin, Tom Demeo, Everett Kissinger, Kitty LaBounty, Bill Pawuk, and Randy West.

Plant associations have been developed only for the conifer forests on the Tongass National Forest. Plant associations have not been developed for other vegetational communities such as cottonwood, muskegs, and shrub communities. At the present time, it is not possible to accurately calculate the acres of each plant association on the Forest; this is primarily due to the fact that soils mapping has not been completed and/or entered into the GIS database for several Wilderness areas. However, the following information on vegetation is displayed in the AMS:

1) Acres of old-growth forest are presented in the Chapter 3 section titled Old-Growth Forests.
2) Acres of old-growth forest, acres within four forest successional stages, and acres of other vegetative communities (such as cottonwood, alder, grass, muskeg, etc.) are presented in the Chapter 3 section titled Wildlife.
3) Descriptions of vegetation and land which are classified as wetlands is presented in the Chapter 3 section titled Water.

Number of Animal and Plant Species

This element of biological diversity is an accounting of all plant and animal species known to occur on the Tongass National Forest. The Tongass National Forest provides habitat for 72 species of mammals, 231 species of birds, and 5 species of amphibians and reptiles (Taylor 1979). There are an additional 18 species of marine mammals found in Southeast Alaska which depend entirely on the marine environment, 45 species of birds which are considered casual or accidental visitors to Southeast Alaska, and 3 species of amphibians and reptiles which are considered casual or accidental visitors to Southeast Alaska (Taylor 1979). Table 3-9 provides a summary of the mammals, birds, amphibians and reptiles occurring on the Forest. The Chapter 3 section titled Wildlife provides additional information on these animal species.

TABLE 3-9
NUMBER OF SPECIES OCCURRING IN SOUTHEAST ALASKA BY SCIENTIFIC ORDER

BIRDS	Number of Regular Occurring Species 1/	Number of Occasional Occurring Species 1/	Number of Known/ Probable Breeders
Scientific Order:			
Gaviiformes (Loons)	4	0	2
Podicipediformes (Grebes)	4	0	0
Procellariiformes (Albatrosses, Fulmars, Petrels)	9	1	2
Pelecaniformes (Cormorants)	2	1	2
Ciconiiformes (Herons, Bitterns)	2	1	2
Anseriformes (Ducks, Geese, Swans)	36 2/	8	21
Falconiformes (Hawks, Eagles, Falcons)	12	0	8
Galliformes (Grouse, Ptarmigan)	5	1	5
Gruiformes (Cranes, Coots)	3	0	2
Charadriiformes (Shorebirds, Gulls, Alcids)	55	11	25
Columbiformes (Pigeons, Doves)	3	0	2
Strigiformes (Owls)	9	2	3
Caprimulgiformes (Nighthawk)	1	1	0
Apodiformes (Swifts, Hummingbirds)	4	0	3
Coraciiformes (Kingfisher)	1	0	1
Piciformes (Woodpeckers)	6	0	5
Passeriformes (Perching Birds)	75	19	64
MAMMALS			
Scientific Order:			
Insectivora (Shrews)	4	0	4
Chiroptera (Bats)	6	0	6
Lagomorpha (Hares, Pika)	2	0	2
Rodentia (Mice, Squirrels, Voles)	21	0	21
Cetacea (Whales, Dolphins, Porpoise)	17	1	?
Carnivora (Wolf, Weasel, Bear, Otter, etc.)	15	0	15
Pinnipedia (Seals, Sea Lions)	3	1	3
Artiodactyla (Deer, Moose, Mtn. Goat, Elk)	4	0	4
AMPHIBIANS AND REPTILES			
Scientific Order:			
Caudata (Newt, Salamander)	2	1	2
Anura (Toads, Frogs)	3	0	3
Squamata (Snakes)	0	1	0
Chelonia (Turtles)	0	1	0

Source: Taylor 1979

1/ Number of regular occurring species represents those species which are considered rare, uncommon, or common, but occur annually in Southeast Alaska. Number of occasional occurring species represents species which do not occur annually in Southeast Alaska.

2/ The four subspecies of Canada geese are counted as separate species.

Thirty-seven freshwater and anadromous fish species are found in the freshwaters of Southeast Alaska (Taylor 1979). Eight of these are primarily marine species, ten species are uncommon freshwater, and 19 are common freshwater or anadromous species. Thirty-six species of marine invertebrates (species without vertebrae, such as clams and crabs) are commonly found in the near-freshwater environment (Taylor 1979). The Chapter 3 section titled Fish presents additional information on the fish species on the Tongass National Forest.

Approximately 1,000 vascular plant species occur in Southeast Alaska, with 151 of these species being introduced since Russian contact (Muller 1983). These species can be grouped into five life forms: 1) Pteridophytes - which includes species of ferns, horsetails, club mosses and quillworts; 2) Graminoids - which includes species of grasses, sedges and rushes; 3) Forbs - includes plant species which die back each year and are not woody; 4) Shrubs - low woody perennial plants (usually under 10 feet) frequently with multiple stems; 5) Trees - are tall woody plants (usually over 10 feet), generally with one main trunk. Table 3-10 summarizes the number of vascular plant species present in Southeast Alaska by each of the life forms.

TABLE 3-10
NUMBER OF VASCULAR PLANT SPECIES IN SOUTHEAST ALASKA BY LIFE FORM GROUP.

	Pteridophytes	Graminoids	Forb	Shrubs	Trees
Native Species	52	186	510	93	21
Introduced Species	0	31	116	2	2

Source: Muller, M. 1983. A Preliminary Checklist of the Vascular Plants in Southeastern Alaska. USDA Forest Service, Admin. Doc. Number 112.

With our current state of knowledge, four plant species have been identified as possible endemics to Southeast Alaska. (In this instance, endemics are plants only found in Southeast Alaska and no other place in the world.) All four species have questionable taxonomic status, and further field study and investigation is necessary to establish the validity of the species. A summary of these four species follows:

Castilleja chrymactis: Beach meadows habitat; possible endemic to northern Southeast Alaska; taxonomic questions need to be resolved.

Habenaria gracilis: Wet meadows habitat; known only from extreme southern Southeast Alaska and adjacent British Columbia; some authors place this species with H. saccata; taxonomic questions need to be resolved.

Poa merrilliana: Known only from Hubbard Glacier area; probably should be placed with P. leptocoma; further field and taxonomic study necessary to determine status.

Poa norbergii: Known only from Hoonah area; probably should be placed with P. macrocalyx; further field and taxonomic study necessary to determine status.

Species Extinctions and Introductions

The great auk (a flightless bird) and the Steller's sea cows are extinct on the Tongass National Forest due to overharvest during Russia ownership of Southeast Alaska in the mid-1800's (Ray 1988). Marten, red squirrel, and mountain goat were introduced on many of the islands; previously they existed only on the mainland (Burris and McKnight 1973). Elk, which are not native to Southeast Alaska, have recently been introduced on Etolin Island; a small number of elk have naturally dispersed from Etolin Island to Zarembo Island. The Chapter 3 section on Wildlife contains additional information on the current distribution of marten, red squirrel, and mountain goat.

Brook trout and arctic grayling, which are not native to Southeast Alaska, have been introduced into several lakes and streams. Many lakes in Southeast Alaska were stocked by brook trout commencing about 1916 through the late 1950's. Most of these stockings failed. Presently, 17 lakes throughout Southeast Alaska are known to contain brook trout (Schwan et al. 1984). Arctic grayling were stocked in lakes commencing in 1950 and continuing after statehood. The success of these stockings has varied from complete failure to excellent. Currently, 17 lakes are known to contain reproducing populations of grayling (Schwan et al. 1984).

Some fish stocking efforts have utilized fish from areas outside of Southeast Alaska, and although they have not introduced a new species, they have introduced different genetic stocks of fish.

Species Abundance and Distribution

The National Forest Management Act provides direction to maintain viable populations of vertebrates that are well distributed throughout the planning area (USDA Forest Service 1982). To accomplish this direction, historical and current distributions and abundance of species must be understood and discussed. Discussion of all 356 animal and 1,000 plant species found on the Tongass National Forest is not possible nor are data available to discuss each species. Rather, the emphasis is placed on those species identified by the public as issues or management concerns. Such species include endemics, threatened, endangered, and sensitive species, and species receiving emphasis for management. The following Chapter 3 sections in the AMS provide information on species abundance and distributions: Fish, Wildlife, Threatened, Endangered and Sensitive Species, and Research Natural Areas.

Management Indicator Species (MIS)

Population changes of Management Indicator Species (MIS) are believed to reflect the effects of land management activities. Evaluation of all the species occurring within a planning area can be reduced through this concept to a number that promotes meaningful evaluation. The evaluation of the effects of management practices on MIS and their habitats provides an additional basis for ensuring the maintenance of biological diversity.

Eight mammals, five birds, and three fish species were selected as Management Indicator Species for the Tongass National Forest from 29 proposed species (Sidle and Suring 1986). Information on the habitat relationships of MIS is incorporated in Forest planning through the application of habitat suitability and habitat capability models. Such models are used to project the response of MIS to changes in habitat quality and diversity.

Chapter 3 sections titled Fish and Wildlife display the habitat capability of the Tongass National Forest for each of the Management Indicator Species.

Habitat Fragmentation

This element of biological diversity describes the natural condition of habitats in terms of old-growth patch size and distribution, and the effects of management on patch size and distribution. Discussions of fragmentation illustrate the effect of management activities on the quantity, size and distribution of habitats. Emphasis is placed on the Management Indicator Species; threatened, endangered, and sensitive species; and endemic and other species' habitats identified by the public or interagency committees as an issue or concern.

Three concepts were developed which describe how species generally utilize or respond to their environment with regard to minimum old-growth patch size and or corridors. The amount of contiguous habitat and the extent similar habitats connect by corridors are currently considered key concepts in managing for biological diversity.

LANDSCAPE CONCEPT.--Wildlife species included under this concept generally have large seasonal or year-long home ranges and territories. These species are capable of utilizing a wide variety of vegetative conditions, although preferences for certain vegetation types exist which provide a higher quantity/quality of forage or cover needs. Usually there is not just one critical or limiting season which has been identified for the species. Species will travel or move through a wide variety of habitats to utilize their environment, therefore, specific corridor requirements are not needed. These species do not have a minimum old-growth patch size requirement to use a particular habitat. Managing or maintaining preferred or higher quality vegetation types will result in higher populations than managing or maintaining less preferred or lower quality vegetation types. Managing to minimize "population sinks" will increase habitat effectiveness and is an important management priority. "Population sinks" are factors such as roads and human disturbance which either directly affect a population through displacement of individuals from preferred habitats or through mortality (Knight et al. 1988).

COMMUNITY CONCEPT.--Wildlife species generally have smaller home ranges and territories than in the landscape concept. Sometimes a particular season of the year is considered a critical or limiting season which greatly influences overall population numbers. These species show a high preference or requirement for a particular vegetative community or combination of communities, especially during the season of the year which is considered critical. Preferred or required habitats may need to be within the mean dispersal.distance of the species and corridors may be needed. These species generally show a relationship with patch size of the preferred or required habitats. In some situations, as patch sizes are reduced, a species may be displaced by another species which can more effectively use the the habitat. Management concerns for these species include maintaining proper dispersal of habitats and effective corridors between habitats, where required.

STRUCTURAL CONCEPT.--Wildlife species in this category require a specific or unique habitat element or site for their presence, such as a pond or cliff for nesting. Often, the size, location, and abundance of these sites are the result of natural geologic or climatic events rather than the effects of management. Management concerns for these species include: (1) maintaining the integrity of the site, (2) preventing human disturbances which would cause the species to abandon the site, and (3) understanding and managing for natural disturbances (such as blowdown) which can affect the site.

Each of the MIS (except fish) and proposed sensitive species (except fish) selected for the Tongass National Forest was placed within one of the the above concepts (Table 3-11). For the species within the landscape and structural concepts, the habitat capability models and or management direction indicate habitat relationships and management opportunities. Specific patch size relationships and corridors are not applicable to these species. Species within the community concept are thought to be sensitive to minimum-sized patches of habitat and, in most cases, corridors. As old-growth patch size decreases the value of the habitat decreases. When patches fall below the minimum size they no longer provide habitat for the species. Guidelines for corridors include definition of plant communities' suitability to serve as corridors for each species. The Chapter 3 sections titled Wildlife and Threatened, Endangered and Sensitive Species document the old-growth patch sizes and corridor requirements for each of these species.

Habitat fragmentation is a concern primarily associated with timber harvesting. Table 3-12 displays the areas of the Forest classified as roaded or roadless. Most of the timber harvesting which has occurred on the Forest will be associated with the areas classified as roaded. An analysis of the amount of habitat fragmentation occurring in the roaded areas is not possible with the Forest-wide GIS database. However, this table provides a perspective for the amount of area on the Forest where possible habitat fragmentation has occurred.

Species Vulnerability

The emphasis in this element is to identify plant and animal species or other unique genetic stocks that may be impacted by environmental events or human activities. These species include threatened and endangered species listed under authority of the Endangered Species Act of 1973, as amended, by the U.S. Fish and Wildlife Service or National Marine Fisheries Service. These species also include those which are identified by State endangered species laws, or species which may be identified by the Regional Forester as sensitive species.

There are eight species of whales, and two sub-species of peregrine falcon that are currently listed as threatened or endangered under authority of the Endangered Species Act. One species of plant and three animal species are currently "Category 2 Candidate" species, which means they are being considered for listing as threatened or endangered. No sensitive species have been officially identified by the Regional Forester; however, three birds and three fish are currently being evaluated. Table 3-13 lists these species. The Chapter 3 section on Threatened, Endangered and Sensitive Species displays information for each of these species.

TABLE 3-11
MANAGEMENT INDICATOR SPECIES AND PROPOSED SENSITIVE SPECIES ON THE TONGASS NATIONAL FOREST, BY LANDSCAPE, COMMUNITY AND STRUCTURAL CONCEPTS.

Concept	Species
Landscape	Brown bear
	Black bear
	Gray wolf
	River otter
	Mountain goat
	North American lynx
Community	Marten
	Red squirrel
	Red-breasted sapsucker
	Hairy woodpecker
	Brown creeper
	Marbled murrelet
	Vancouver Canada goose
	Glacier Bay water shrew
	Sitka black-tailed deer
Structural	Bald eagle
	Trumpeter swan
	Peregrine falcon
	Osprey

TABLE 3-12

ACRES OF EACH GEOZONE CLASSIFIED AS ROADLESS OR ROADED.

Geozone	Roadless Acres	Roaded Acres	% Roaded	Geozone	Roadless Acres	Roaded Acres	% Roaded	Geozone	Roadless Acres	Roaded Acres	% Roaded
C01	175,616	500	00	K01	128,585	1,440	01	S01	222,557	79,662	26
C02	316,758	37,449	11	K02	46,785	0	00	S02	124,065	0	00
C03	65,926	0	00	K04	427,126	60,835	12	S03	234,108	82,435	26
C04	33,490	7,538	18	K05	193,473	0	00	S04	50,074	65,208	57
C05	115,460	4,553	04	K06	442,094	257,864	37	S05	48,222	69,361	59
C06	329,501	43,218	12	K07	279,242	0	00	S06	217,372	17,681	08
C07	12,239	0	00	K08	323,471	58,315	15	S07	93,699	25,844	22
C09	272,399	22,333	08	K09	138,669	3,095	02	S08	589,698	21,770	04
C10	388,212	43,706	10	K10	102,881	40	00	S09	746,235	18,331	02
C11	126,120	0	00	K11	107,206	117,002	52	S10	268,052	19,214	07
C12	207,772	0	00	K12	107,882	0	00	S11	67,540	0	00
C13	315,736	0	00	K13	2,280,758	0	00	S12	446,299	2,404	01
C14	650,103	0	00	K14	87,567	0	00	S13	47,675	140	00
C15	952,933	11,349	01	K15	35,123	0	00	S14	27,056	16,987	39
C16	98,030	40	00								
C17	349,134	0	00								
C18	207,278	7,253	03								
C20	86,362	380	00								
C21	181,422	1,299	01								
C22	716,434	2,904	00								
C23	1,966,678	4,444	00								
C24	153,407	6,078	04								
C25	240,296	421	00								
TOTAL	7,961,306	193,465	02	TOTAL	4,700,862	498,591	10	TOTAL	3,182,652	419,037	12

TOTAL ROADLESS ACRES	15,844,820
TOTAL ROADED ACRES	1,111,093
TOTAL ACRES	16,955,913

Source: Revision Database November 21, 1989.

TABLE 3-13
THREATENED, ENDANGERED, CANDIDATE AND SENSITIVE SPECIES OCCURRING ON OR ADJACENT TO THE TONGASS NF

Species	Federally Listed T/E	Federally Listed Candidate	State Listed Endangered	Potential Sensitive 1/
Humpback Whale (Megaptera novaeangliae)	E		E	
Gray Whale (Eschrichtius robustus)	E			
Sei Whale (Balaenoptera borealis)	E			
Sperm Whale (Physeter macrocephalus)	E			
Bowhead Whale (Baleana mysticetus)	E			
Fin Whale (Balaenoptera physalus)	E			
Blue Whale (Balaenoptera musculus)	E		E	
Black Right Whale (Balaena glacialis)	E		E	
American Peregrine Falcon (Falco peregrinus anatum)	E		E	
Arctic Peregrine Falcon (Falco peregrinus tundrius)	T		E	
Thlaspi arcticum (plant)		2		
Glacier Bay Water Shrew (Sores alaskanus)		2		
North American Lynx (Felis lynx canadensis)		2		
Marbled Murrelet (Brachyramphus marmoratum)		2		
Prince of Wales Flying Squirrel (Glaucomys sabrinus griseifrons)		3c 2/		
Sumez Island Ermine (Mustela erminea seclusa)		3c 2/		
Osprey (Pandion haliaetus)				X
Peale's Peregrine Falcon (Falco peregrinus pealei)				X
Trumpeter Swan (Cygnus buccinator)				X
Northern Pike (Esox lucius)				X
Fish Creek Chum Salmon (Oncorhynchus keta - genetic stock)				X
King Salmon River and Wheeler Creek King Salmon (Oncorhynchus tshawytscha - genetic stock)				X

1/ As of January 1990, no sensitive species have been listed by the Regional Forester.
2/ Category 3c comprise species that are now considered to be more abundant or widespread, and/or substantially less subject to identifiable threats, than previously thought.
Source: Official correspondence with the U. S. Fish and Wildlife Service, National Marine Fisheries Service, Alaska Department of Fish and Game.

DEMAND ASSESSMENT

Biological diversity is currently a major topic of discussion among many segments of society, both nationally and worldwide. Within the United States, Congress is currently studying potential legislation pertaining to biological diversity. Natural resource scientists are working on ways to define, measure and maintain biological diversity.

EXISTING DIRECTION

The term "biological diversity" was not used in the Tongass Land Management Plan. However, the direction in TLMP for various resources and management activities has a direct bearing on biological diversity. Some examples include:

1. The Forest was allocated to land use designations (LUD) as follows: LUD 1 National Monument Wilderness and Wilderness - 33 percent of the Forest; LUD 1 Non-Wilderness National Monument - one percent of the Forest; LUD 1 Release Areas - 2 percent of the Forest; LUD 2 Areas - 16 percent of the Forest; LUD 3 Areas - 17 percent of the Forest; LUD 4 Areas - 25 percent of the Forest.

2. Timber harvesting would occur in the LUD 3 and 4 areas. To help lessen the impact of timber harvesting on old growth dependent wildlife species in LUD 3 and 4 areas, 273,000 acres of commercial forest land was to be retained (not harvested) during the timber rotation. An additional 244,000 acres of commercial forest land was to be managed under extended timber harvest rotations of up to 200 years. These 517,000 acres collectively became known as retention acres. In general terms, LUD 3 areas were to allow an average of 30 percent of the operable old growth to be retained, and LUD 4 areas were to allow an average of 13 percent of the operable old growth to be retained.

RESULTS OF TLMP IMPLEMENTATION

At the present time, no plant or animal species have been lost nor have any species been listed as threatened or endangered due to forest management activities. Almost all of the resource management programs on the Forest have an affect on biological diversity. Each of the Resource Environment Section in Chapter 3 of the AMS will contain information on results of TLMP implementation. Listed below are a few activities which have been implemented during the 1980's which are part of biological diversity.

1. The Region developed Aquatic Habitat Management Guidelines to maintain or enhance aquatic habitats and to coordinate resource management activities which may affect aquatic habitats.

2. The Tongass National Forest and the Alaska Region and Forestry Sciences Lab worked on a second-growth management program through the 1980's to gain information on possible techniques to improve second growth as wildlife habitat. Most of the work has dealt with thinning second-growth stands to prolong the presence of understory forbs and shrubs which are important as forage for many species, and thinning older stands to see if this would promote the establishment and growth of understory forbs and shrubs. In November 1988, the Region held a Second-Growth Management Workshop to summarize current knowledge, develop management guidelines to guide future second growth management, and identify knowledge gaps, monitoring and research needs.

3. The Region began work on defining old-growth forests. An interagency workshop was held to begin work on old-growth definitions and management approaches. Results of the workshop were presented at the 54th North American Wildlife and Natural Resources Conference (Samson et al. 1989).

4. Research on forested plant associations was conducted during the 1980's (Martin 1989).

5. The Region developed an Ecology Steering Committee to provide leadership in biological diversity.

6. In the Fall 1989, Region 10 of the Forest Service implemented a sensitive plant species challenge cost-share agreement with the Alaska Natural Heritage Program/The Nature Conservancy. Under this partnership agreement, the Alaska Natural Heritage Program will conduct an exhaustive inventory to identify plant species for consideration for sensitive species designation by the Regional Forester.

7. Between TLMP's approval in 1979 and January 1990, only one RNA has been established (the Red River Research Natural Area in 1980). With its addition, there are now six existing RNA's on the Forest. The Gambier Bay RNA is still in the establishment process.

8. Research has been conducted in the existing Research Natural Areas on such subjects as landscape ecological studies, plant succession, characteristics and dynamics of old-growth forests, decline of Alaska yellow-cedar, brown bear behavior and brown bear/human interactions.

9. In January 1989, Region 10 of the Forest Service established a process to identify sensitive species for the Region.

10. Currently the Alaska Region and Tongass National Forest are developing guidelines for biological diversity. The following provides a brief overview of proposed guidelines:

    Proposed Regional Guidelines. The regional biological diversity guidelines stress management on an ecological basis to maintain viable populations of animals and plants and associated ecological processes. Management will include (1) consideration and maintenance of animal and plant populations with particular emphasis on Threatened, Endangered and Sensitive species; (2) capturing representative communities in RNA's and wilderness areas, especially rare and/or endemic plant and animal species or communities via a geoprovince basis; (3) Managing by prescription of important habitats, such as riparian, old-growth, seabird rookeries, mammal haulout sites, etc. No species or habitat type will be lost.

    Proposed Forest Guidelines. Forest biological diversity guidelines stress (1) considering Regional diversity guidelines; (2) emphasizing recommendations based on the recent Old-growth Workshop, Second-growth Workshop, and landscape management group; (3) specifically for old growth, retaining, where possible, contiguous stands, emphasizing large forest stands, and including corridors and networking old-growth stands, and recommending size and type of old growth needed for fish and wildlife based habitat requirements of MIS. (4) In areas of harvest, emphasize treatments at time of entry--leaving patches of vegetation, snags, green trees that will become snags, and feathered edges--and subsequent second-growth treatments--gaps, thinning, etc. Overall, the objective should maintain or develop habitat sizes, patterns, and spacing essential to meet or exceed NFMA diversity requirements.

    Proposed Project Guidelines. All Regional and Forest diversity guidelines should be considered to ensure that project activities and management will provide for the diversity goals established in Forest Plans and that they

will utilize appropriate management standards and guidelines which help achieve ecosystem structure and function for plant and animal species.

OPPORTUNITIES AND CONCERNS

Resource management activities may have an affect on biological diversity by altering the structure, function and suitability of habitats which result in changes in the distribution and abundance of plant and animal species. Some of the structural components of the forest which can be altered by resource management are: large diameter old-growth trees, snags, large downed woody debris, stands large enough to be windfirm, understory shrub and forb layers, multi-layered canopies. These structural components provide important functions such as snow interception, nesting habitat for large branches, habitat for cavity-nesting species, cover and habitat for fish, forage and cover for many species.

Resource management activities can also displace animals from otherwise suitable habitat. Without proper regulation, human activities can result in increased mortality, legal and illegal, which can affect the abundance and distribution of species.

There is an opportunity to provide increased awareness and increased management direction for biological diversity. Following are some of the management approaches currently under consideration during revision of the Tongass National Forest Plan:

1. Proposals for additional experimental forests

2. Over 100 roadless area re-evaluations for wilderness consideration

3. Forty-six proposed Research Natural Areas for consideration

4. Division of the Forest into 50 geographic zones (GEOZONES) for analysis

5. Forest-wide standards and guidelines for threatened, endangered and sensitive species

6. Standards and guidelines for deer, bald eagle, bear, marine mammals, seabird rookeries, trumpeter swan (Cygnus buccinator), Canada geese (Branta canadensis), and other waterfowl, osprey, peregrine falcon, snag/cavity nesters, and moose (Alces alces)

7. Definitions, standards, and guidelines for old-growth habitat, including vegetative structure and patch size for beach, riparian and upland areas

8. Determination of eligibility and suitability of rivers for wild, scenic and recreation status

9. Development of old-growth, beach fringe, riparian, and wildlife/timber (i.e., landscape ecology) management prescriptions

10. Definition of patch size needs, corridor needs, and population viability for the Management Indicator Species for each of 50 geographic zones (geozones)

CULTURAL AND HISTORICAL

OVERVIEW

Cultural resources located on the Tongass National Forest include a diverse range of prehistoric and historic sites and artifacts that span approximately 10,000 years of human occupation and resource use. The oldest sites located thus far are characterized by microblade (small stone blades with sharp cutting edges) and microblade core (the prepared stone from which blades are removed) tool technology, which is thought to be an adaptation for use of marine resources that was present from approximately 10,000 to 5,000 years before present (B.P.). This technology appears to have been replaced by a ground and polished slate tool industry.

The cause for this change may include the introduction of a new cultural group into the region (cultural affiliation cannot be determined from current knowledge), or it may indicate an adaptation to changing environmental conditions. "Presently known prehistoric sites in Southeast Alaska dating younger than approximately 5000 B.P. all seem to share elements of a Northwest Coast cultural pattern, but our data are yet too fragmentary to demonstrate clearly anything like a developmental sequence that spans the last 5000 years of prehistoric time." (Arndt, Sackett, Ketz 1987; 65).

"Ethnohistorically, Southeast Alaska has been the home of the Tlingit, Alaskan Haida (Kaigani), and the Tsetsaut. Of the three, the Tlingit have been dominant, controlling at one time or another the entire Southeast from just north of Yakutat Bay (displacing the Eyak just prior to Euro-American contact) south to Dixon Entrance. The Alaskan Haida are relatively new to the region, having migrated from the Queen Charlotte Islands sometime in the early eighteenth century and having displaced the established Tlingit culture on the lower forty percent of Prince of Wales Island and adjacent islands to the west. The Tsetsaut, an Athabaskan cultural group, emphasized exploitation of land resources. They never completely adapted to a coastal environment and fell under the influence of neighboring cultural groups. They became culturally extinct by the late nineteenth century." (Arndt, Sackett, Ketz 1987; 85). The origins and decline of these cultural groups and their traditions remains an important research question. Prehistoric remains include campsites, village sites, graves, resource areas, rock art, portages, and rock shelters.

The historic period in Alaska began with the second Kamchatka Expedition of Vitus Bering in 1741. Subsequent explorations by the Russians, Spanish, French, and English and colonization by the Russian-American Company in Yakutat and Sitka provided the impetus for European development and cultural influence in Southeast Alaska (Arndt, Sackett, Ketz 1987; 163-255). Historic sites include houses, cabins, mines, quarries, trails, portages, tramways, salteries, canneries, boatworks, boats, shipwrecks, military installations and Civilian Conservation Corps trails, shelters, camps, campgrounds, and buildings.

Many of these cultural remains provide the only record of former human occupation, work areas, and lifestyles. There may be areas on the Tongass National Forest which have religious or cultural significance for Native Americans that have not yet been identified. The recovery of information from these sites and objects enables professional cultural resource specialists (a person trained in anthropology, archaeology, historical architecture, history, or other cultural resource disciplines) to reconstruct previous human behavior and adaptation in response to environmental or social change. This information may

become increasingly important in predicting future human behavior and adaptations to local, regional, and global environmental changes that are occurring today.

In accordance with the National Historic Preservation Act, as amended, the National Environmental Policy Act, and a series of implementing regulations and policy direction, the Tongass National Forest has undertaken a program to identify, evaluate, preserve, and protect cultural resources. The 1987 publication "A Cultural Resource Overview of the Tongass National Forest" (Cultural Resource Overview) by Arndt, Sackett, and Ketz reviews the presently known environmental changes since deglaciation, including vegetational development, changes in sea level, and other conditions affecting human activity. Additional information includes previous studies of the prehistory, history, and ethnography; and the current inventory of cultural resource sites on the Forest.

SUPPLY/INVENTORY EXISTING

Between 1976 and 1986, approximately 68,000 acres of National Forest Lands were inventoried: 8,000 acres of intensively surveyed project area, and 60,000 acres of reconnaissance level survey. This work was done mostly in support of the timber sale program. Currently, professional cultural resource specialists, technicians, or qualified contractors inventory 5,000 acres a year. To date, all previous surface inspections account for less than 1 percent of the Tongass National Forest's acreage.

"The passage of the Alaska Native Claims Settlement Act (ANCSA) and the Alaska Lands Act has set in motion large-scale changes in land-use and ownership patterns. These changes have had a significant effect on the Region's cultural resource management program. The immediate potential effect of the Alaska Native Claims Settlement Act might be to place as much as 20 percent of the Region's inventoried cultural resources into private (Native Regional and Village corporation) or state ownership." (USDA Forest Service, Alaska Regional Guide, 1984; 2-47). Approximately 517,445 acres containing 59 known sites have been conveyed to the Native Regional Corporations. Approximately 153,995 acres of land have been conveyed to the State of Alaska. The cultural properties associated with the continuing change in land ownership has created a dynamic inventory process.

A confidential cultural resource site inventory is maintained at each Administrative Area of the Tongass National Forest, and in the Alaska State Office of History and Archaeology. Sensitive information is protected to prevent vandalism or unauthorized use, and is exempt from Freedom of Information Act requests. The State inventory (Alaska Heritage Resources Survey, AHRS) and the Cultural Resource Overview provide information about the inventory and evaluation status of known cultural resources located in Southeast Alaska. This information is displayed in tables 3-14 and 3-15.

TABLE 3-14
NUMBER OF INVENTORIED CULTURAL RESOURCE SITES -- STATUS OF DOCUMENTATION

410 Prehistoric Sites (143 field verified-most not dated or documented).
1,388 Ethnographic Sites (840 field verified-most not dated or documented).
300 Historic Anglo/European sites (number verified unknown-most not dated or documented).

Source: Cultural Resource Overview, 1987

TABLE 3-15
NUMBER OF SITES EVALUATED FOR THE NATIONAL REGISTER OF HISTORIC PLACES (NRHP)

36 sites determined eligible.
5 sites listed on Register.
1 site achieved National Historic Landmark status.
42 sites evaluated.

Source: Alaska Heritage Resource Survey, AHRS, 1989

The present AHRS inventory system includes sites on Federal and State lands and sites on adjacent and intermingled private land (Sealaska, 1975), but does not always distinguish between land ownerships (AHRS 1989). The Forest does not presently have a computerized inventory system.

POTENTIAL

Cultural resources located on the Tongass National Forest represent an important part of our local, regional, and national cultural heritage. Currently, the inventory is incomplete and the number of known sites may represent only a small portion of the total number of cultural resources that actually exist on the Forest.

Archaeological investigations of early prehistoric sites within the Forest indicate that stone tool traditions (microblade/core technology) are similar to those now known to exist in Siberia, Japan, Interior Alaska, and British Columbia (Ackerman 1980, 1987a, 1987c).

These and other cultural resources which remain on the Forest are non-renewable, and may not be duplicated elsewhere. As inventory/survey efforts become more intensive, cultural resources will continue to be identified. A dynamic approach will provide flexibility as method, technology, and management priorities evolve with time.

Cultural resource management practices are governed by legal compliance standards (Section 106, 110 of the National Historic Preservation Act; 36 CFR 800). These standards require intensive, systematic examination of project areas to provide reasonable assurance that all significant cultural resources are identified, evaluated, and protected. Relatively high densities of undiscovered cultural resources are expected to be located within the Forest. Information gathered from these efforts will provide opportunities to learn more about resource distribution, improved methods of site discovery, sensitivity to damage, and data collection. Survey methods and a computerized inventory data system are being developed to provide a higher level of protection, evaluation, and interpretation.

RELATIONSHIPS OF CULTURAL RESOURCES WITH OTHER RESOURCES

The interaction between cultural resource management and multiple-use management of Forest resources can be beneficial. A systematic inventory well in advance of project activities eliminates costly delays or other impacts while protecting the resource, providing greater flexibility for management options. The collection and analysis of information about previous environmental conditions and human adaptation may be beneficial for the management of other environmental components of the Forest, as well as providing recreational and interpretive values. Preservation and protection of the Forest's cultural resources are closely associated with the location of the resource, the nature of the management activity, and the environmental characteristics of the areas where these

activities occur. Impacts to the resource may occur from natural forces, project-related activities, or from public access.

High Probability Areas

Specific types of cultural resources (sites, artifacts, and observable results of human activity) have a greater probability of being located in areas including but not limited to: intertidal zones, beach fringes, riparian zones, areas of known mineral deposits, areas of other known resources, and uplifted fossil beaches. These generalized locations are also influenced by other environmental variables, such as as slope, aspect, and elevation. The environmental characteristics that invited human use and habitation in prehistoric times are often the same factors which invite use today. However, because of elevational and sea level changes after deglaciation, the location of the earliest human activity areas may be further inland and at higher elevations than more recent human activity areas. Some significant historical activities may have occurred at any elevation, such as mineral explorations or international boundary surveys.

Protection of significant human activity areas (sites, artifacts) begins with a systematic, intensive inspection of areas where management activities are proposed, well in advance of project implementation. Other resource management activities can proceed in this way without endangering the values of significant cultural resources.

Management which emphasizes the conservation of amenity resources including fish and wildlife habitat and old growth timber stands directly benefits cultural resources. In many instances, retention of a natural environment is crucial to imparting and protecting the values which qualify a cultural resource for National Register significance. This is particularly important when cultural properties derive part of their significance from their historically natural environmental setting.

Inventory and protection of cultural resources in areas managed for retention of fish and wildlife, old-growth habitats, wilderness and other amenity resources are subject to the same cultural resource management requirements as other areas of the Forest. However, inventory and protection work is often restricted to project-related priorities.

Areas managed for recreation provide opportunities for protection and interpretation for the public education and enjoyment. Active educational and interpretive programs may create a greater awareness of the importance of cultural resources to our heritage and foster a sense of stewardship while adding to the recreational experience.

Ground disturbing activities have the potential to adversely affect cultural resources and their environmental settings. The amount of impact is determined largely by the location and nature of the activity, the characteristics of the soils, and the degree of use. Management activities have benefited cultural resources by providing opportunities for inventory, evaluation and interpretation in remote areas of the Forest.

Cultural resource management may increase the cost of project implementation. Some areas may need to be avoided entirely in order to protect the cultural resources. This may result in greater expense in accessing sites and a loss of commercial products, such as timber or minerals. Costs may also increase due to project delays, or to additional mitigation requirements which may be imposed if

cultural resources are discovered. Usually, however, development activities are not precluded.

EXISTING DIRECTION

Existing direction for managing cultural resources is located in applicable Federal Law (National Historic Preservation Act, as amended; National Environmental Policy Act of 1969; Archaeological Resources Protection Act, as amended; American Indian Religious Freedom Act), Federal Regulations (36 CFR 800, 36 CFR 63, 36 CFR 294), Forest Service Manual 2300, and the Alaska Area and Regional Guides.

The Alaska Area Guide direction, incorporated into the Regional Guide, provides the following direction (USDA Forest Service, 1983 B-58,59):

1. Manage cultural resources as a non-renewable National heritage:
   a. Assure cultural resource specialists input to project planning at the earliest possible time.
   b. Evaluate cultural resources for inclusion in the National Register of Historic Places.
   c. Forest Service plans and programs affecting cultural resources need to contribute to the preservation and enhancement of cultural resources and assure access to sites or resources important to traditional. Native religious practices, rites, or ceremonies.
   d. Avoid adverse effects where possible, or develop mitigation alternatives in consultation with the State Historic Preservation Officer and Advisory Council on Historic Preservation.
2. Encourage and cooperate with recognized educational institutions in the identification and study of historic and archaeological sites.
3. Provide cultural awareness opportunities for the public as well as Forest Service personnel to illustrate and foster an awareness and understanding of the variety, complexity, and adaptability of prehistoric and historic Native cultures of the Region.
4. Cooperate with the State and private owners of cultural resources to develop programs for the protection, public interpretation and education about cultural resources and their management on National Forest System Lands.

RESULTS OF TLMP IMPLEMENTATION

During implementation of the Tongass Land Management Plan the cultural resource management program has located, protected and evaluated historical and archaeological remains representing a portion of the non-renewable national heritage using procedures and direction established by law and implementing regulations. This statutory direction provides for the inventory, evaluation, protection, preservation, and interpretation of all significant cultural resources on all National Forest System Lands.

Due to the large size of the Tongass National Forest, and multiple-use management priorities, the cultural resource program has been limited to reactive management. The workload for legal compliance has exceeded the program's ability to provide comprehensive management.

"Cultural resource survey is labor intensive...Efficiency is often measured in terms of dollars or man-hours expended per unit area, while effectiveness refers to success in discovering some proportion of the cultural resources actually present." (Arndt, Sackett, Ketz 1987: 284).

Inventory/survey has been accomplished primarily for timber harvest activities. There have been few surveys in designated Wilderness or non-project areas to

locate or protect cultural resources. Environmental conditions and the logistical requirements on the Forest make cultural survey a tedious and expensive activity. Survey standards for legal project clearance currently require an intensive, systematic examination of project areas that provides reasonable assurance that all significant cultural resources are identified, evaluated, and protected.

Although culture resources have been involved early in the planning process, this has not helped the program to avoid reactive management. Survey timing has been largely dictated by multiple-use management priorities. Existing manual policy and direction requires survey and assessment to be completed prior to the approval of an environmental assessment or environmental impact statement.

The majority of cultural sites located have not been evaluated for National Register of Historic Places inclusion. National Register evaluation and nomination are a commitment of time that normally is devoted to other aspects of cultural resource management, and National register evaluations do not get done as a result.

Multiple-use management activities have provided opportunities for the identification of previously unknown cultural properties. "In the FEIS [of the Tongass Land Management Plan], a statement was made that the most significant cultural and historical sites had been selected by Native Corporations under ANCSA. Several hundred sites have since been discovered on the Tongass National Forest, including villages, resource collection sites, rock carvings and paintings, totems, canneries, fox farms, homesteads and farms, etc" (USDA Forest Service, Tongass Land Management Plan Evaluation Report, 1984: 112).

Cultural resources have the potential to be adversely impacted in all forest areas allocated to vegetation and land modification. Project-related damage has been rare since the "Section 106" process of the National Historic Preservation Act was established. "In the TLMP FEIS, it was anticipated that implementation of a preferred alternative under TLMP would have little or no effect on cultural resources. In the intervening years, formal and informal consultations to determine the effects of proposed undertakings on sites have tripled, but three significant sites were inadvertently impacted...In at least three cases, the discovery of significant sites in the vicinity of projects resulted in monitoring on a regular basis to ensure they would not be degraded" (USDA Forest Service, Tongass Land Management Plan Evaluation 1984: 112). Impacts to cultural and historical resources also occur from deterioration by natural forces and public use. Monitoring of the condition of known cultural resources that are not potentially affected by project related activities has been infrequent.

Site stabilization and repair are management treatments that are rarely undertaken to preserve deteriorating or damaged sites even though these procedures are legally mandated. No comprehensive stabilization plan or funds for these purposes have been budgeted during implementation of the Tongass Land Management Plan.

Due to jurisdictional problems or program requirements, protection against vandalism has been implemented with some success but remains an elusive goal. Law enforcement efforts have undoubtedly had an effect on reducing vandalism; however, developing a public awareness program that illustrates the problem created by recreational or commercial relic collecting is necessary to insure long-term success.

Cooperation with recognized educational institutions has been encouraged, however, relatively little academic research has been done on the Forest. "In other parts of the United States, cultural resource managers have been able to draw upon the results of academic research conducted on both Federal and adjacent private lands. Very little academic research has been directed toward the archaeological resources of Southeast Alaska." (Arndt, Sackett, Ketz 1987: 287).

The cultural resource program on the Forest has not provided enhancement and interpretive activities as a regularly scheduled activity. When they are done, they take the form of presentations at professional meetings and schools, the publication of formal reports and newspaper articles, and the production of videos and slide programs. Some artifacts of special significance have been curated with the Alaska State Museum and the Sealaska Heritage Center under agreements for the conservation, preservation, and interpretation of the artifacts.

OPPORTUNITIES AND CONCERNS

Members of the public have expressed concern that the Forest Service should inventory, manage, and protect cultural resources and Native American religious sites; should concentrate efforts in areas of the highest potential; and should provide for public interpretation.

An opportunity exists for additional management activities in the wilderness and non-project areas where relatively undisturbed sites could provide reliable information about the nature and distribution of cultural resources. Some areas previously investigated should be re-examined with current (1989) intensive methods. Field verification of all sites that have not been documented should be a scheduled management activity.

An automated data system for the cultural resource inventory is prerequisite to an effective assessment of the current backlog of resources to be evaluated, interpreted, and protected. Most areas within the Tongass National Forest have not been inventoried, and a large backlog of known sites has yet to be evaluated, interpreted, and protected.

The future demand for cultural resources is likely to include the development and expansion of scientific research, recreational use, and the specific association of ethnic communities with traditional sites or areas of cultural sensitivity. Public interest in cultural resource values is expected to increase.

Involving the public in the development of management direction for cultural properties may help to identify the level of demand for recreational use. It is expected that substantial public use of established interpretive programs and designated historic points of interest will expand.

University and museum based research is anticipated to increase in the future with the recognition of the exceptional value of the Forest's cultural resources and the information potential that they contain.

There is a need for development of cooperative protection and management agreements with State, Native, and other private landowners. Current priorities include developing public education programs through cost-share agreements, establishing site stewardship programs, increasing law enforcement surveillance of sensitive areas, and developing an inspection schedule for National Register eligible sites. Additional opportunities and coordination efforts with the State

Historic Preservation Officer, and other State and Federal agencies exist in developing the State Historic Preservation Plan and other cultural resource plans.

Contemporary Native American groups which consider portions of the Tongass National Forest as traditional use lands are the Tlingit and the Haida. Use generally falls into the two categories of resource procurement and religious use. These two categories may sometimes be combined (see subsistence portion of this chapter).

Coordination of Forest programs and activities with Native American cultural groups is authorized by the American Indian Religious Freedom Act, which protects traditional religions, rites, and sacred areas. This relationship is often complex when relating social/cultural/religious values with forest resource management. Some Native Americans may be reluctant to reveal religious beliefs or information about sacred areas when dealing with outsiders such as anthropologists and government representatives. The concept of religion or sacred areas can be difficult to express to persons of other cultures. These limitations make it difficult to inventory areas of religious/sacred value or other traditional use. Continuing study, program evaluation and a positive interaction with the public will prove useful in identifying areas of cultural sensitivity.

ENERGY

OVERVIEW

With increasing world demand for fossil fuels and the resulting rise in energy prices, the energy needed for forest management activities and programs is a concern. The Tongass National Forest uses energy for timber, recreation, fish, wildlife, and engineering management activities.

Energy coefficients have been developed by Schwarzbart and Schmitz (1982) which provide a means of determining energy consumption for Forest practices. The energy coefficients are based primarily on data from Pacific Coast States, and reflect present, rather than future, energy use conditions. The study by Schwarzbart and Schmitz (1982) was designed to serve broad-range planning purposes and is not intended to provide detailed project evaluations.

SUPPLY

Energy consumption was evaluated for timber management, logging operations, construction and maintenance of logging roads, transportation of logs to the mill, and processing of wood products on the Tongass National Forest. Energy uses on Forest Service lands were not evaluated for recreation projects, fish and wildlife projects, soil improvements, mining operations, sport fishing and hunting, and subsistence. Energy uses on non-Forest Service lands for activities such as commercial fishing and Native logging were also not evaluated.

The basic unit of comparison for the various activities is called a British Thermal Unit or BTU. A BTU is defined as the heat required to raise the temperature of one pound of water from 62 degrees fahrenheit to 63 degrees fahrenheit (one degree fahrenheit). For example; one gallon of diesel fuel produces 156,000 BTU's and one gallon of gasoline produces 147,000 BTU's.

Timber Management

Timber management incorporates energy outputs for timber sale preparation and administration. Fifty million BTU's are used per million board feet of timber prepared and offered. Table 3-16 illustrates the energy used to conduct forest management between 1980 to 1988. The average energy expended between 1980 and 1988 was 22.6 billion BTU's per year and the total consumption of energy for the nine year period was 203.3 billion BTU's.

TABLE 3-16
ENERGY USED IN TIMBER SALE PREPARATION AND ADMINISTRATION 1980 to 1988

Year	Million Board Feet Offered	Billion BTU's
1980	539	26.95
1981	545	27.25
1982	478	23.90
1983	459	22.95
1984	476	23.80
1985	432	21.60
1986	382	19.10
1987	408	20.40
1988	347	17.35
TOTAL		203.30

Logging Operations

The energy consumption associated with logging activities depends on the equipment used, the terrain, type of silvicultural prescription, and yield per unit area. Approximately 420 million BTU's are used per thousand board feet of timber harvested. Table 3-17 illustrates the energy used in logging operations between 1980 to 1988. The average energy expended between 1980 and 1988 was 119.93 billion BTU's per year and the total consumption of energy for the nine year period was 1,079.4 billion BTU's.

TABLE 3-17
ENERGY EXPENDITURES FOR CONDUCTING LOGGING HARVEST OPERATIONS 1980 AND 1988

Year	Million Board Feet Harvested	Billion BTU's
1980	428	179.76
1981	340	142.80
1982	327	137.34
1983	220	92.40
1984	227	95.34
1985	163	68.46
1986	251	105.42
1987	282	118.44
1988	332	139.44
TOTAL		1,079.40

Road Construction

The energy consumption associated with construction and maintenance of logging roads depends on the road standards, equipment used, the terrain, and subgrade materials. Approximately 800 million BTU's of energy are used to construct one mile of logging road and approximately 560 million BTU's of energy are used to reconstruct one mile of logging road. Table 3-18 illustrates the energy expended for the construction and reconstruction of logging roads on the Tongass National Forest between 1980 and 1988. These figures do not include the energy required for temporary spur roads, log transfer facilities, and log sort yards.

The energy used to construct new logging roads between 1980 and 1988 was 751.04 billion BTU's and the energy used to reconstruct logging roads during the same period was 161.22 billion BTU's. The energy expended to construct and reconstruct logging roads between 1980 and 1988 was 912.26 billion BTU's and the average consumption of energy for the nine year period was 101.36 billion BTU's per year.

Transport to Mill

Diesel powered log trucks on the Tongass National Forest use approximately 5.5 million BTU's per million board feet mile transported with an average haul to saltwater of 10 miles. The energy used to transport logs by diesel truck to the saltwater is 55.0 million BTU's per million board feet. Logs are then placed in rafts and towed by tugboats to the mills. Tugboats use approximately 2.34 million BTU's per million board feet mile transported, assuming 15 gallons of diesel fuel are used to tow one million board feet one mile. The average tow on the Tongass National Forest by tug from the log transfer facility to the mill is 100 miles. The energy used to transport log rafts by tugboat to the mill is 234 million BTU's per million board feet.

TABLE 3-18
ENERGY EXPENDITURE FOR CONSTRUCTING AND MAINTAINING LOGGING ROADS, 1980 TO 1988

Year	Miles of New Construction	Billion BTU's	Miles of Reconstruction	Billion BTU's
1980	59.0	47.20	7.9	4.42
1981	131.7	105.02	70.5	39.48
1982	219.3	175.44	0.0	0.00
1983	104.4	83.52	19.4	10.86
1984	73.7	58.96	57.2	32.03
1985	59.7	47.76	33.2	18.59
1986	111.9	89.52	27.0	15.12
1987	75.0	60.00	50.7	28.39
1988	104.1	83.28	22.0	12.32
Totals	938.8	751.04	287.9	161.22

Approximately 289.0 million BTU's are used per million board feet to transport logs from the landing to the mill in Southeast Alaska. Table 3-19 illustrates the energy expended to transport harvested timber to the mill between 1980 to 1988. The average energy expended between 1980 and 1988 was 82.53 billion BTU's per year and the total consumption of energy for the nine year period was 742.73 billion BTU's.

TABLE 3-19
ENERGY USED TO TRANSPORT HARVESTED TIMBER FROM LANDING TO MILL, 1980 TO 1988

Year	Million Board Ft Transported	Billion BTU's
1980	428	123.69
1981	340	98.26
1982	327	94.50
1983	220	63.58
1984	227	65.60
1985	163	47.11
1986	251	72.54
1987	282	81.50
1988	332	95.95
TOTAL		742.73

Wood Processing

Timber harvested on the Tongass is used for pulp (45 percent), cants (40 percent), and dimension lumber (15 percent). The energy used to manufacture timber into pulp for the Ketchikan pulp mill is estimated to be 29.7 billion BTU's per million board feet. Dimension lumber consumes about 1.5 billion BTU's per million board feet manufactured. Cants require approximately two-thirds of the energy needed to manufacture dimension lumber (personal communication G. Schwarzbart, 1989). Therefore, about 1.0 billion BTU's per million board feet of energy are used to manufacture cants. Table 3-20 illustrates the energy expended to process harvested timber in the mills between 1980 to 1988. The average energy expended between 1980 and 1988 was 4.0 trillion BTU's per year and the total consumption of energy for the nine year period was 35.90 trillion BTU's.

TABLE 3-20
ENERGY USED TO PROCESS TIMBER BETWEEN 1980 AND 1988

Year	Million Board Harvest Processed	Trillion BTU's Pulp	Trillion BTU's Cants	Trillion BTU's Dimension	Total
1980	428	5.71	0.17	0.10	5.98
1981	340	4.54	0.14	0.08	4.75
1982	327	4.36	0.13	0.07	4.57
1983	220	2.94	0.09	0.05	3.07
1984	227	3.03	0.09	0.05	3.17
1985	163	2.17	0.07	0.04	2.28
1986	251	3.35	0.10	0.06	3.51
1987	282	3.76	0.11	0.06	3.94
1988	332	4.43	0.13	0.08	4.64
TOTAL		34.29	1.03	0.58	35.90

The total energy consumed on the Tongass National Forest to perform all timber related activities -- timber management, logging, road construction, transport to mills, and wood processing -- between 1980 and 1988 was 38.84 trillion BTU's. The average annual energy used was 4.32 trillion BTU's per year.

DEMAND ASSESSMENT

Energy is used by everyone in their day to day lives. Without energy, society would not have modern agriculture, commercial fishing and logging operations, airplanes, and automobiles. The current doubling time for world population growth is 38 years, while energy consumption doubles every 24 years (Peters, 1987).

On the Tongass National Forest, energy consumption is expected to closely follow the demand for timber, road construction, and wood processing. The average annual demand of 22.6 billion BTU's per year for timber management, 119.93 billion BTU's per year for logging extraction, 101.36 billion BTU's for logging road construction and reconstruction, 82.53 billion BTU's to transport logs to the mill, and 4.0 trillion BTU's to process the logs in the mills is expected to continue.

EXISTING DIRECTION

Required energy consumption and energy conservation potential shall be considered in environmental analyses as stated in, and regulated by, 40 CFR 1502.

RESULTS OF TLMP IMPLEMENTATION

Energy consumption and energy conservation potential were not discussed in the Tongass Land Management Plan, therefore, there was no implementation. Energy was discussed in relative terms in the Alaska Regional Guide (1983).

OPPORTUNITIES AND CONCERNS

Considering energy use can aid the public and managers in choosing in determining if a need exist to change current management direction. Considering energy use can also help Areas and Districts manage their energy and dollar resources more efficiently.

EXPERIMENTAL FORESTS

OVERVIEW

Experimental forests provide lands for conducting research that serves as a basis for forest management. Experimental forests provide areas for "manipulative" research, wherein the natural resources are designed to be used or altered under controlled scientific studies. It is the policy of the Forest Service to establish experimental forests of sufficient number and size to provide for the research necessary for the management of land.

The value of experimental forests is widely recognized within the National Forest System. Some of the most compelling benefits of these areas include:

1. Establishment of a long-term data base with wide applicability to various disciplines. Such a data base attracts "outside" research personnel, resources, and funding. Experimental forests can become centers of regional ecologic research.
2. Ability to tailor land use impacts to a proposed study design. The timing, characteristics, and intensity of management impacts can be critical to an experiment. Experience has shown that these variables are best controlled within an experimental forest.

SUPPLY/INVENTORY

There are currently two experimental forests within the Tongass National Forest: Young Bay and Maybeso.

YOUNG BAY

The Young Bay Experimental Forest is located just south of Juneau on northern Admiralty Island. Originally selected for long-term hydrologic and fisheries monitoring with a paired comparison between streams, this site was used extensively for fisheries and hydrology research in the 1960's and 1970's, including the construction of artificial stream channels, labs, housing for field personnel, and installation of permanent weather monitoring stations.

Located mostly on steep north-facing slopes underlain by shallow soils derived from colluvium and weathered glacial till, this experimental forest has an extensive terrace or bench underlain by poorly-drained marine silt (the Gastineau Formation) which extends across the lower slopes between sea level and 100 feet in elevation. As a result this part of the forest, being open and relatively unproductive, is atypical of those normally managed for timber production in Southeast Alaska. Little forest vegetation type diversity is present making Young Bay difficult to use for other studies. Due to high winds, access during the winter is often difficult.

MAYBESO

Established in the early 1950's as a part of an intensive research program to document the effects of large scale clearcutting on hydrology, fisheries, and timber productivity, the Maybeso Experimental Forest is located on a large steep-sided alluvial valley with a south to southeast facing aspect near the central-eastern coast of Prince of Wales Island in southern Southeast Alaska. By the early 1960's most of the experimental area has been clearcut. Permanent research plots were established and monitored to study hillslope erosion, movement of large woody debris in streams, forest regeneration, and silvicultural responses to precommercial thinning. Most of these plots are still being monitored.

Since nearly all of the commercial timber on the experimental forest has been clearcut, there are limited opportunities to design new experiments on anything but regeneration. The valley is somewhat atypical of the region in that it is highly productive for timber, has high erosion rates associated with logging and

road building, and a climate which is much milder than the central and northern panhandle. Only a limited variety of vegetation and timber types are available within the forest. Research completed here is of limited applicability to other areas.

DEMAND ASSESSMENT
GENERAL PURPOSE

Current experimental forest needs include: 1) the need to have experimental forests in which long-term monitoring and manipulative experiments can be done for demonstration purposes and basic research; and 2) the need to be able to carefully control and monitor the nature and timing of experimental treatments. Research work in experimental forests is not a substitute for research now being done cooperatively throughout the Forest, but an important supplement to it. No single location is likely to meet all criteria, therefore, more than two experimental forests are necessary.

ECOSYSTEMS NEEDED

New experimental forests must represent a wide range of forest and vegetation types that span the full range of typical occurrences within intensively managed drainages on the Tongass. Large variations in slope, aspect, soil drainage and parent materials should be important elements of this ecosystem diversity. Examples of island versus mainland and northern versus southern panhandle are most desirable.

Experimental forests should possess enough resource diversity to allow a wide range of research projects across a large number of disciplines. Areas should contain high, or at least diverse, salmonid populations, riparian zones, and stream sizes and types, as well as a reasonable population or at least the habitat for some of the dominant wildlife species such as Sitka black-tailed deer, brown bear, mountain goats, and furbearers. Desirable forest characteristics including a wide range in forest productivity, species composition, and stand structure for silvicultural experiments.

Although accessibility can be a problem in terms of vandalism and unauthorized use of facilities, new experimental forests should be easily accessible year-round. Many research projects involve fall or winter field work. Access during these seasons should be a consideration.

POTENTIAL
RECOMMENDED SITES

The following is a list of recommended sites for experimental forest designation Figure 3-7 displays the location of recommended experimental forests. These recommendations were developed by the USDA Forest Service - Forestry Sciences Lab in Juneau. Sites are listed in order of suitability and priority. Designation of the first four sites listed as experimental forests would provide a broad geographic distribution and range of ecosystem types within Southeast Alaska. In order to achieve a similar ecosystem diversity, more than one alternative site may be appropriate as a replacement for one of the four high priority sites.

FIGURE 3-7
SITES RECOMMENDED FOR EXPERIMENTAL FOREST DESIGNATION

MAP NOT AVAILABLE AT THIS TIME

HIGH PRIORITY **Kadashan Bay Watershed**	Tenakee Inlet, Sitka Ranger District, including the watersheds of Kadashan River, Hook Creek, Tonalite Creek, and an unnamed watershed between Tonalite Creek and Fog Creek. Because it contains well-developed and diverse stream systems, diverse vegetation types, and productive fish and wildlife habitat, all research groups at the Forestry Sciences Lab identified this site as the most suitable for a future experimental forest. For several years, this site has been successfully used for a research site by the Forestry Sciences Lab (FSL), the State of Alaska and University cooperators. FSL fisheries and watershed groups are currently conducting research. The Alaska Department of Fish and Game has expressed its intent to expand its current fisheries and wildlife research. FSL, NFS (Chatham Area), and ADF&G all have well-maintained cabins at the site, greatly facilitating research. A main road access route exists.
Chuck River Watershed	Windham Bay, Juneau Ranger District. The Chuck River watershed offers a good example of a mainland ecosystem with a productive natural salmonid stream and good examples of floodplain spruce forests. Nearby roads allow access to high elevation portions of the watershed. Intensive on-the-ground reconnaissance indicates that an extensive road system within the area is also feasible.
Shaheen Creek Watershed	West coast of central Prince of Wales Island, Thorne Bay Ranger District. For several years by the fisheries and watershed groups at FSL and cooperators at other Forest Service research labs have used the Shaheen watershed and nearby areas. Areas previously impacted by land management are readily accessible for experimental purposes. Good road access is available.
Alvin Bay Watershed	Kuiu Island, Petersburg Ranger District. In the past, the Forestry Sciences Lab watershed group has conducted considerable research at this site. A Forest Service gauging station already exists here. The 1986-90 Operating Period for Alaska Pulp Corporation Long-term Sale Area Final Environmental Impact Statement schedules this and nearby areas for road building and timber harvesting.
ALTERNATIVE SITES **Trap Bay Watershed**	Tenakee Inlet, Sitka Ranger District. For several years, the Trap Bay watershed has been a research site used by the Forestry Sciences Lab, university cooperators, ADF&G and National Marine Fisheries. The watershed, fisheries, and timber groups of FSL and university cooperators are currently conducting active research programs at the site. FSL and National Marine Fisheries Service have well maintained cabins and storage buildings. Ferry and aircraft service is available to nearby Tenakee Springs, facilitating logistics and response to emergencies. The 1986-90 Operating Period for Alaska Pulp Corporation Long-term Sale Area Final Environmental Impact Statement schedules this and nearby areas for road building and timber harvesting.
Staney Creek Watershed	Northwest Prince of Wales Island, Thorne Bay Ranger District. This watershed as well as nearby areas have been used for research by the fisheries and watershed groups at FSL, and by cooperators at other Forest Service research labs for several years. Areas previously impacted by land management are readily accessible for experimental purposes. Good road access is available.

Wukuklook Creek Watershed

Northeast Chichagof Island, Hoonah Ranger District.
The Wukuklook Watershed contains good ecosystem diversity including old-growth riparian stands and muskeg areas. This site and surrounding area are scheduled for road building and timber harvesting in the 1986-90 Operating Period for the Alaska Pulp Corporation Long-term Sale Area Final Environmental Impact Statement.

Gypsum Creek Watershed

Northeast Chichagof Island, Hoonah Ranger District.
Good ecosystem diversity including old-growth riparian stands and muskeg areas describes the Gypsum Creek Watershed. This site and the nearby area are scheduled for road building and timber harvesting in the 1986-90 Operating Period for the Alaska Pulp Corporation Long-term Sale Area Final Environmental Impact Statement.

Seal Creek Watershed

Northern Chichagof Island, Hoonah Ranger District.
This small watershed can be used in conjunction with other sites to provide a range of ecosystem diversity. An access road currently exists to the lower basin. This site and the surrounding area are scheduled for road building and timber harvesting in the 1986-90 Operating Period for the Alaska Pulp Corporation Long-term Sale Area Final Environmental Impact Statement.

Chicken Creek Watershed

Northern Chichagof Island, Hoonah Ranger District.
Good ecosystem diversity, highly varied physiography, a well developed stream system and range of channel types are characteristic of the Chicken Creek watershed. Access to this area would be very expensive, thus a limitation for its development as an experimental forest.

EXISTING DIRECTION

Tongass Land Management Plan direction recognized that experimental forests existed on the Forest, and that acres of timber land within them were removed from the suitable timber land base (that is, they do not contribute to the ASQ).

OPPORTUNITIES AND CONCERNS

1. An opportunity exists to establish future management direction for experimental forests.

2. Several of the proposed experimental forests are either in proposed wilderness, proposed moratorium areas, or are scheduled to be harvested in existing 5-year Timber Operating Plans. Depending on the outcome of legislation and/or appeals, additional work may be needed to recommend additional areas for experimental forests.

3. There is a concern that the two existing experimental forests do not contain the natural resources needed to conduct the kinds of research to address today's public issues and management concerns.

4. There is an opportunity to designate new experimental forests which will lend themselves to needed long-term research projects.

5. With the addition of new experimental forests, these is an opportunity to encourage long-term research with cooperating agencies and educational institutions.

FACILITIES

OVERVIEW

A facility is defined as a single or contiguous group of improvements that exists to shelter or to support Forest Service programs. The term may be used in either a broad or narrow context; for example, a facility may be a ranger station compound, leased office, work center, separate housing area, or utility system. Facilities provide office and housing space, storage for all areas of activity, maintenance shops, etc., necessary to carry out the Forest's management objectives and activities.

SUPPLY/INVENTORY

The Forest Service presently operates administrative sites in over 70 locations in Southeast Alaska. These locations range from the Supervisors Offices in Sitka, Petersburg, and Ketchikan to isolated work centers situated throughout the Forest. Besides administrative sites, a visitor center is maintained at Mendenhall Glacier.

Numerous boat and floatplane docks, water and sewage treatment plants (in certain remote locations), power-generation buildings, and other facilities are required in support of these sites.

DEMAND ASSESSMENT

The current Facilities Master Plan identifies facilities projects as needed to meet current Forest goals.

EXISTING DIRECTION

Construction

The National priorities for facility construction and reconstruction are the following:

1. Projects which cannot be deferred without severely impacting the Region's ability to meet mandated statutory, regulatory, or policy requirements. Examples incude handicap access and fire exits.
2. Projects which significantly promote the immediate health and safety of employees.
3. Projects which produce significant cost savings and efficiency increases. Include projects which are needed to meet program outputs in the next several years.
4. Projects needed to meet current resource output targets, and projects which will significantly reduce unit costs and increase productivity.
5. Projects that enhance management effectiveness, reduce employee turnover, and aid in recruitment in remote and high cost areas.

The Forest guidelines for the construction and reconstruction of buildings and related structures are as follows:

1. Evaluate potential for lease facilities versus Forest Service construction, prior to proposing new project designs.

2. Emphasize:
   - Energy conservation
   - Employee safety
   - Program management and production efficiency
   - Service to public
   - Documentation of clearly identified needs in accordance with manual direction for new projects.

3. Abate health and safety hazards, comply with drinking water and waste water treatment/disposal and solid waste collection/disposal standards.
4. Correct deficiencies identified by condition surveys to lessen health and safety hazards.

Maintenance

The National priorities for facilities maintenance are as follows:

1. Maintenance of facilities to comply with laws and regulations which prescribe facility standards. Examples include, handicap access, and fire exits.
2. Maintenance of facilities that can adversely affect the health and safety of employees and users.
3. Maintenance or rehabilitation of facilities which contribute to increased resource production.
4. Maintenance of facilities to substantially reduce future maintenance and rehabilitation cost.

Forest Guidelines for facilities maintenance are:

1. Health and Safety--Abate health and safety hazards and comply with potable water, waste water treatment/disposal, and solid waste collection/disposal standards.
2. Program Support--Maintain facilities to a service level standard necessary to achieve program objectives and to maintain acceptable productivity costs. Maintenance which contributes to increased resource production and reduced unit costs should receive highest priority.
3. Energy Conservation--Complete energy retrofit projects in accordance with FSH 2109.31 and as required by the National Energy Conservation Policy Act (Public Law 95-619).
4. Facility Deterioration--Correct deficiencies identified by condition inspections to prevent further deterioration, and to avoid future increased cost by reconditioning.
5. Civil Rights--Provide separate and/or equal facilities for women and access for handicapped individuals, to the extent feasible under maintenance funding authority.
6. Operation and Maintenance (O&M) Plans--Develop multi-year facility O&M plans in accordance with FSM 7310 and the new R-10 Facilities Maintenance Management System (FMMS) data base, or other subsequently developed system. The data base should be a workable tool on all units and maintenance expenditures should be supported by an annual update of the data base.

RESULTS OF TLMP IMPLEMENTATION

At the beginning of the last planning period, many of the buildings occupied by the Forest Service were either over-aged wooden structures, with numerous deficiencies, or temporary mobile homes that were pressed into administrative use. In response to expanded legislative requirements for overall management, the workforce on the Forest had more than doubled in the years between 1974 to 1980. This greatly overloaded existing facilities. In addition to the lack of space, there was a lack of facilities near to work locations. This caused frequent exposure to air travel hazards, and morale problems due to lengthy separations of employees from their families.

In 1980 the Forest Service developed the "Thirty-Year Facility Needs Report for the Alaska Region" to provide direction in solving the facilities problems. The goals outlined in this report and in subsequently developed "Facilities Master Plans" were to provide more or better facilities, in an attempt to reduce air travel time and separation of field personnel from their families.

Table 3-21 presents facilities projects that have been completed on the Forest since fiscal year 1981. The costs shown are usually the approximate final contract construction cost; they do not include items such as design or contract administration.

TABLE 3-21
FOREST SERVICE FACILITIES COMPLETED SINCE 1981

FISCAL YEAR	FACILITY	COST
81	Thorne Bay RS Site Prep	$1,561,000
82	Fuel Storage facility, Juneau Ranger Station	78,000
	Warehouse replacement at Cascade Creek Administration Site, Sitka Ranger District	549,000
	Warehouse at Rowan Bay Work Center, Petersburg Ranger District	200,000
	Barracks-Office-Warehouse Bldg and Vehicle Storage Bldg at Corner Bay Work Center, Sitka Ranger District	901,000
	Two floating field camps, Ketchikan Area	718,000
	Office, Thorne Bay Ranger Station	400,000
	Warehouse, Thorne Bay Ranger Station	1,234,000
	Flammables Storage Bldg and Pumphouse, Thorne Bay Ranger Station	200,000
	Electrical Distribution System, Thorne Bay Ranger Station	180,000
83	Barracks-Office-Warehouse Bldg, Portage Bay Work Center, Petersburg Ranger District	726,000
	Single family residence, Petersburg Ranger Sta.	102,000
	Barracks (18-person), Ketchikan Ranger Station	428,000
	Floating Field Camp, Chatham Area	200,000
84	Duplex Family Units (4), Thorne Bay Ranger Sta.	694,000
	Four-plex Housing Units (3), Thorne Bay Ranger Station	695,000
	Barracks (30-person), Thorne Bay Ranger Station	601,000
	Office, Misty Fiords National Monument and Ketchikan Ranger District	850,000
	Warehouse expansion, Juneau Ranger Station	72,000
85	Marine Facility, Wrangell Ranger Station	352,000
	Duplex, Thorne Bay Ranger Station	253,000
	YACC Floating Camp rehabilitation for Misty Fiords National Monument	125,000
	Duplex Family Units (4), Hoonah Ranger Station	947,000
	Wrangell Ranger Station Compound Site Development	296,000
	Wrangell Ranger Station Compound Utilities	75,000
86	Marine Facility, Wrangell Ranger Station	352,000
	Office, Wrangell Ranger Station	717,000
	Barracks (16-person), Hoonah Ranger Station	496,000
	Fire Protection (Sprinkler) System, Juneau Ranger Station Buildings	77,000
	Trailer Pad Facilities (2), Yakutat Work Center Juneau Ranger District	59,000

TABLE 3-21 (Continued)
FOREST SERVICE FACILITIES COMPLETED SINCE 1981

87	Flammable Storage, Wrangell Ranger Station	25,000
	Warehouse, Wrangell Ranger Station	438,000
	Barracks (12-person), Wrangell Ranger Station	303,000
	Administrative Site Paving and Landscaping, Wrangell Ranger Station	150,000
	Land Purchase for Hoonah Ranger Station Warehouse and Compound	218,000
88	Wrangell Storage Shed	35,000
	TLMP Office Expansion, Juneau Ranger District	50,000

Justification for the buildings and support facilities was based upon the increasing cost of aircraft travel (an increase of 400 percent from 1974 to 1979), loss of employee productivity while in travel status, safety considerations caused by flying in marginal weather, reduced morale of employees separated from their families, and the high employee turnover that resulted.

Although the building construction program is only partially completed, many of the expectations have already been realized. Air travel flight time between 1979 (13,000 flight hours,000) and 1988 was reduced nearly 50 percent. The annual aircraft cost was reduced from about $3 million in 1979 to about $2 million in 1988. Permanent full-time employee turnover in the Region has reduced from 25-30 percent in 1979 to about 20 percent in 1988. Surveys of employees assigned to remote Ranger Stations indicate improved morale since 1979.

It would appear that due to these factors the effective savings would approach $2 million per year when comparing 1979 to 1988. However, there are a number of other factors besides the building construction program that have contributed to these savings. These include: fewer temporary employees due to the contracting of more field work, fewer opportunities for employees to rotate back to other Regions, and more efficient methods of contracting aircraft flying services.

OPPORTUNITIES

With adequate funding the opportunity exists in this planning period to further the building construction program started in 1980. However, very little funding is currently available for the facilities program, not only on the Tongass National Forest but nationwide. Even the maintenance of the currently existing facilities is not receiving high priority at the national level. The fiscal year 1989 facilities maintenance budget was about half of what was needed for a good preventive maintenance program.

Another concern is that while much progress was made in providing employee housing facilities, there remains a need for improved Ranger Station offices to provide service to the public.

Facilities projects on the Forest could be accomplished using funds from both the Forest Service and state or private interests. This would benefit all parties involved, especially during budget reductions. For example, a coordinated effort between the Forest Service and the State of Alaska could provide the needed funding for a dock facility that could be used to enhance access to both State and National Forest lands. This type of opportunity should be actively pursued.

FIRE

OVERVIEW

Due to the large amounts of precipitation in Southeast Alaska, wildfire occurrence on the Tongass National Forest has historically been low. An annual average of 14 fires has been recorded in the National Fire Data Library records over the past 30 years (see table 3-22), although the number each year varies considerably (see figure 3-8). Ninety-five percent of these fires were less than nine acres in size, with most less than one-quarter acre.

SUPPLY/INVENTORY
EXISTING

Wildfire

Types of fires. Three types of wildfires are common to Southeast Alaska: recreation beach fires, other inland or higher elevation recreational fires, and equipment fires. Lightning is not considered to be a threatening factor because of its rarity in Southeast Alaska, and because heavy precipitation accompanies it when it does occur. Recreational beach fires and higher elevation fires that are left unattended comprise about 92 percent of fire occurrences in Southeast Alaska: unsuppressed, they tend to spread very slowly and burn deeply. If left unsuppressed, these fires may result in some resource losses and generally become a nuisance that is constantly reported by the recreation public, landowners, and local cooperators. The remaining fires that occur on the Forest are equipment fires--those fires started from any mechanical, contractor, or equipment activities. Commonly associated with heavy concentrations of dead, woody logging debris (slash piles, decks, and slash remaining in the cutting units following logging), these fires tend to be larger than other fire types. Equipment fires, because of their potential to grow larger, generally require more fire suppression forces.

Fire suppression forces. There are no fully funded fire personnel on the Tongass National Forest. Fire suppression forces are comprised of permanent and seasonal employees from all disciplines. Their role is to be trained, qualified, equipped, and seasonally prepared to assist in wildfire suppression on the Forest. In addition, Tongass fire suppression forces provide assistance on the Chugach National Forest, to the interior of Alaska, and to other states.

FIGURE 3-8
FIRE OCCURRENCES ON THE TONGASS NATIONAL FOREST, 1968-1988

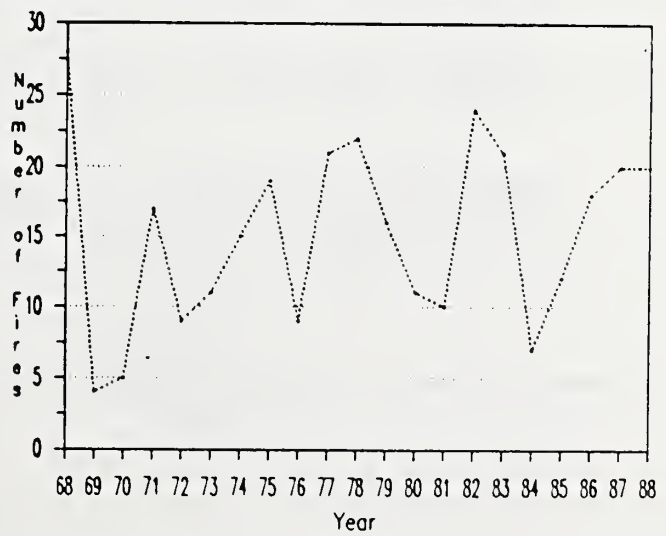


TABLE 3-22

TONGASS NATIONAL FOREST WILDFIRE OCCURRENCE SUMMARY: 1958-1988

Year	Number of Fires by Class 1/					Total	Total
	A	B	C	D	E+	Fires	Acres
1988	5	12	3	-	-	20	112.4
1987	15	3	2	-	-	20	61.0
1986	10	8	-	-	-	18	4.1
1985	12	-	-	-	-	12	2.1
1984	7	-	-	-	-	7	1.0
1983	18	3	-	-	-	21	4.3
1982	23	1	-	-	-	24	3.3
1981	6	4	-	-	-	10	4.6
1980	8	1	1	-	1	11	612.8
1979	14	2	-	-	-	16	3.4
1978	18	4	-	-	-	22	39.8
1977	20	1	-	-	-	21	3.0
1976	9	-	-	-	-	9	1.0
1975	18	-	1	-	-	19	13.8
1974	12	3	-	-	-	15	8.2
1973	10	-	1	-	-	11	22.0
1972	8	-	1	-	-	9	9.1
1971	13	3	1	-	-	17	72.6
1970	5	-	-	-	-	15	????
1969	4	-	-	-	-	4	0.4
1968	22	4	1	1	-	28	136.9
1967	11	4	1	1	-	17	167.6
1966	6	-	-	-	-	6	0.6
1965	16	1	1	-	-	18	28.1
1964	8	-	-	-	-	8	1.0
1963	1	6	2	-	-	9	68.1
1962	3	1	-	-	-	4	1.2
1961	3	-	-	-	-	3	0.2
1960	12	2	1	-	-	15	51.7
1959	5	-	-	-	-	5	1.0
1958	21	3	3	-	2	29	1467.9
TOTALS	344	66	19	3	2	435	2904.3
	(79%)	(15%)	(4%)	(1%)	(1%)	(100%)	

Average Number of fires per year = 14 Average acres per fire = 6.7 X

Source: Regional Fire Records Library, Anchorage, Alaska.

1/ Fire Class Legend: A = 0-.25 acres

B = .26-9 acres

C = 10-99 acres

D = 100-299 acres

E = 300-999 acres

F = 1000-4999 acres

G = 5000+ acres

Prescribed Fire

In recent years, the prescribed fire program on the Tongass National Forest has steadily increased. Most Ranger Districts have programs that are supported by the Forest Supervisor's Office with personnel and budgeted money. Prescribed burning programs use fire as a tool in accomplishing timber, silviculture, and wildlife resource management objectives. Due to the need for extensive prescribed fire and fire behavior training, growth of these programs has been very slow.

Although the use of prescribed fire will continue to be constrained by logistical costs of doing business in Southeast Alaska, smoke management, and, to a small extent, air quality requirements, prescribed fire will continue to play an important role as a management tool in local forest ecosystems.

RELATIONSHIPS WITH OTHER RESOURCES

Recreation

With respect to recreation use, fire can affect visual quality, air quality, water quality, and wilderness enjoyment. Adverse effects on the recreation experience can be mitigated by timing prescribed burns to take advantage of weather conditions conducive to rapid combustion and quick dispersion of smoke into the atmosphere. All prescribed burning operations conducted on National Forest System lands, following Forest Service approval, are subject to smoke management constraints established by the Alaska Department of Environmental Conservation. Water quality effects can be mitigated through planning and monitoring the ignition and mop-up sequences. Wildfires in higher recreation resource areas are rapidly suppressed to reduce effects on visual quality and air safety (flying visibility).

Vegetation

Interactions between fire and vegetation are expressed in at least four ways: stand composition, successional development, stand structure, and biomass production and quality.

Stand composition. This is the kind and amount of plant species which comprise the plant community. Fire will select against some species and stimulate others.

Stand succession. This reflects the change in species composition, abundance, and biomass of a community. Fire frequency, a time-related function, affects successional change.

Stand structure. This refers to the density, size, or age class distribution of species throughout a given area. Fire intensity and severity, space related functions, affect stand structure. Stand structure is an important component of habitat diversity.

Biomass production. This is the amount of material grown by a stand over a period of time. Generally, the removal of a lifeform layer by burning will increase production of the remaining layers. Lighter intensity burns will stimulate some existing biomass vigor (sprouting).

Wildlife and Fish

Interactions between wildlife and fire vary in Southeast Alaska. After a wildfire, terrestrial wildlife are immediately introduced to a modified habitat. Depending on species involved, this may have positive and/or negative influences.

Interactions between fire and land surface invertebrates (bugs, snakes, spiders, snails, etc.) generally are short term. On the Tongass National Forest, the primary influence of fire on invertebrates is in the manipulation of the food species that they eat. Vegetation release, growth, or change provide the driving

force for a dynamic system in which vegetative target species are favored and non-target are not.

The most important effects of fire on fish are related to the loss of streamside vegetation and increased sediment load to the stream. Interdisciplinary planning for prescribed fire will address and mitigate these concerns. Wildfire suppression concerns will be addressed for each fire occurrence and the appropriate suppression action employed that will least affect the resources.

Timber

Fire is an important tool in the management of the timber resource. It plays a significant role in preparing harvested areas for reforestation and reducing competition for other vegetation. The intensity and severity of the fire is of primary importance when dealing with timber. The intensity of the fire is a concern when burning takes place in or adjacent to existing timber stands. Trunk damage and crown scorch may occur. Low to moderate intensity fires will tend to remain ground fires, causing minor damage while consuming the surface litter. Removal of the surface litter tends to limit the intensity of future burns by eliminating or removing the ground fuel buildup. A high intensity burn is nonselective and will destroy most of the vegetation on the site and return it to an earlier ecological succession stage. Severity is a function of how long the burning and smoldering stages of the fire last in an area. The length of time a fire is allowed to burn and smolder will determine the severity of its effect on the root systems of adjacent trees. Over time, excessive heat kills roots. In the prescribed fire programs, fire intensities and severities will be monitored and controlled through timing, spacing, and speed of the lighting sequences. In wildfire suppression, fire intensity and severity will be addressed in the appropriate suppression action to protect the timber resource.

Soils

Interaction with soil is a function of burn severity, and the resulting exposure of mineral soil to heating. Burn severity is a function of how long the burning and smoldering stages of the fire last in an area. Land productivity and soil stability are both adversely affected by excessive heat over time. Lower severity and intensity fires lend themselves to the cycling of some nutrients, may help control some disease producing organisms, and generally do not increase soil erosion. Conversely, high severity fires convert more than desirable amounts of nitrogen and other essential nutrients into vapor, destroy organic matter, disrupt soil structure, increase erosion, and may cause the soil to repel water rather than absorb it. Due to the depth and moisture content of the duff layer in Southeast Alaska soils, vital soil values, such as nutrient content, soil structure, and ability to retain water, are unaffected by prescribed burns of low to moderate severity. Wildfire effects can be mitigated through prompt suppression actions.

Air Quality

Fire and the resultant smoke have a short-term impact on air quality. Visibility obstruction is the key factor on the Tongass National Forest. This obstruction will affect flying safety and decrease scenery viewing opportunities. When the prescribed fire plans are followed, air quality effects are short term because atmospheric stability and smoke dispersion monitoring will mitigate most of the concerns.

Cultural

Fire has the potential to reveal cultural sites which have become overgrown with dense vegetation, but can also destroy structures or totems. Close coordination with Cultural Resource specialists during prescribed fire planning and during wildfire suppression will reduce the chances for adverse effects.

Social and Economic

Major wildfires present a threat to life and property, and may affect the social and economic well-being of communities. Local Forest communities which rely on timber, water, soil, visual, and recreation resources can be severely impacted when major wildfires occur. The Southeast Alaska Fire Suppression Plan addresses control priorities when fires affect life and property. Life and property protection is the highest priority and resource values are second, although both are highly emphasized.

DEMAND ASSESSMENT

The need for prescribed burning or slash treatment will increase over the years if the amount of timber harvesting, vegetation management projects, and wildlife habitat improvement projects increase, since these activities use fire as a tool to accomplish resource management objectives.

EXISTING DIRECTION

Evolution of fire management policy. Nationally, the policy on National Forest System lands for wildfire suppression is to respond to all wildfire ignitions in a timely manner with appropriate forces based upon established fire management direction and cost efficiency. Historically, the Tongass National Forest's fire management direction has been to attack and suppress all wildfires as quickly as possible regardless of vegetation type, burning conditions, fuel loading, or land management objectives. This direction has evolved into one that stresses cost-efficient suppression based on objectives for the appropriate suppression action, and is supported by an escaped fire situation analysis beyond initial attack.

Fire protection strategy. State and private lands lie within or adjacent to National Forest lands. Through cooperative fire protection agreements based on economics and the "closest forces concept," the Forest Service has assumed all initial attack responsibilities for Southeast Alaska. This agreement provides suppression personnel, equipment, and support for up to 24 hours at no cost to the benefiting agency.

RESULTS OF TLMP IMPLEMENTATION

No direction for fire management was provided in TLMP. In the last four years, the 1985-1988 fire seasons, fire management program emphasis in Alaska has grown. Forest Service employees are better trained and better equipped, and many have had the opportunity to participate in suppression assignments within Alaska and in other states. Prescribed fire programs have emphasized using fire wisely. Training has been made available to insure we are only burning where necessary and are using personnel that have been properly trained and certified. Additional emphasis has been placed on the burn process from planning through ignition, holding, mop-up, and patrol. Contingency plans have been developed to deal with unforeseen problems in prescribed fire use such as weather changes. Examination of the earlier prescribed fire program shortcomings and failures has been used to build a string of recent successes. The Revision will be the template for Tongass National Forest direction.

OPPORTUNITIES AND CONCERNS

Several factors will continue to affect fire management activities on the Tongass National Forest. The greatest impact to the fire management program will be felt if budgets decrease, resulting in a corresponding decrease in the number of personnel with wildfire responsibilities on the Forest. There will be continued emphasis on training and equipping qualified people. A concern is the depth of training needed to maintain professionalism in fire management programs. The trend has been to train only the number of people needed to maintain the program, then rely upon them to be available every time there is a wildfire or prescribed burn. The emphasis on training people from all disciplines to meet initial attack and suppression assistance needs will

increase. This could be seen as an enhancement to the region's preparedness as well as to the individual person's qualifications. Emphasis on cooperative fire fighting agreements will continue to be very important. Programs in prescribed fire training, equipment cache construction and maintenance, and logistical support will continue to be promoted. These will be conducted in a professional manner, from planning through ignition, mop-up, patrol, monitoring, and evaluation.

FISH

OVERVIEW

Fish and the aquatic resources on the Tongass National Forest provide major subsistence, commercial, and sport fisheries. Abundant rainfall, streams with glacial origins, and watersheds with high densities of streams provide an unusual number and diversity of freshwater fish habitats. These abundant aquatic systems of the Tongass provide spawning and rearing habitats for the majority of fish produced in Southeast Alaska. Maintenance of this habitat, and associated high quality water, is a focal point of public, State and Federal natural resource agencies, as well as user groups, native organizations and individuals.

The Forest includes an estimated 42,500 miles of stream, more than any other in the National Forest system. In addition, there are 20,200 lakes and ponds totaling 260,000 acres. Table 3-23 shows the distribution of the lakes and stream miles by category of fish use.

TABLE 3-23
STREAMS, LAKES, AND TYPE OF FISH USE

Fish use	Stream Miles	Lake and Pond Numbers	Lake and Pond Acres
Anadromous	12,200 1/	4,100	55,400
Resident	24,000	8,900	119,100
Non - fish	18,500	11,300	148,900

Source: Data in the Tongass National Forest's Geographical Information System. Stream mile estimates include an expansion of the inventoried data based on localized detailed samples to verify the inventoried systems. Distribution of lake acreage and numbers into fish categories are estimates. Stream miles in the majority of the wilderness areas were estimated.
1/ There are 14,500 miles of Class 1 streams, which also incorporate high value resident fish streams.

SPECIES

Thirty-seven freshwater and anadromous fish species are found in the freshwaters of Southeastern Alaska (Taylor 1979). Eight of these are primarily marine species, ten species are uncommon freshwater, and 19 are common freshwater or anadromous species. The primary species harvested for sport, subsistence or commercial uses are shown in Table 3-24.

Thirty-six species of marine invertebrates (species without vertebrae, such as clams and crabs) are commonly found in the near-freshwater environment (Taylor 1979). Although these are marine dwellers, some may be affected by upland management activities, such as timber-harvest-related log transfer and storage facilities. Species which may be particularly sensitive to upland management include the king (Paralithodes sp.), dungeness (Cancer magister) and tanner crabs (Chionocoetes bairdi), and butter clams (Saxidomus giganteus).

TABLE 3-24
COMMONLY HARVESTED SPORT, SUBSISTENCE AND COMMERCIAL FISH

Species (species name) 1/	Sport	Subsistence	Commercial
Pacific herring (Clupea harengus pallasi)	X	X	X
Pink salmon (Oncorhynchus gorbuscha)	X	X	X
Chum salmon (Oncorhynchus keta)	X	X	X
Coho salmon (Oncorhynchus kisutch)	X	X	X
Sockeye salmon (Oncorhynchus nerka)	X	X	X
King salmon (Oncorhynchus tshawytscha)	X	X	X
Cutthroat trout (Oncorhynchus clarki)	X		
Rainbow trout & steelhead (Oncorhynchus mykiss)	X		
Dolly Varden char (Salvelinus malma)	X		
Eulachon smelt (Thalcichthys pacificus)		X	

(X = common use)
1/ Alternate names commonly used for the some of the species are: pink/humpback; chum/dog; coho/silver; sockeye/red; king/chinook; eulachon/candlestick.

Sources: Taylor 1979; Alaska Catch and Production Publications and Statewide Sport Fisheries Harvest Reports, published on an annual basis by the Alaska Department of Fish and Game, Juneau.

THREATENED, ENDANGERED, AND SENSITIVE SPECIES

None of the fish species or marine invertebrates on the Tongass are classified by the U.S. Fish and Wildlife Service as threatened or endangered. However, due to their limited distribution or unique qualities, the Forest Service considers three species to be sensitive. These include the northern pike, found only in the Pike Lakes on the Yakutat Forelands, and nowhere else in Alaska south of the Alaska Range; king salmon in King Salmon River and Wheeler Creek on Admiralty Island, the only known native runs of king salmon found on the islands of Southeast Alaska; and chum salmon in Fish Creek near Hyder which produces chum salmon of very large size, probably the largest in North America. More detail on threatened, endangered and sensitive fish species can be found in the "Threatened and Endangered" section of this chapter.

SPECIES EMPHASIS

The Tongass Land Management Plan (TLMP) displayed the aquatic resource effects and outputs of its proposed management alternatives in two ways. The first method rated each Value Comparison Unit (VCU) for its sport fish, commercial fish and estuarine value. Each VCU was then assigned a Land Use Designation (LUD) ranging from commodity development (LUD 4) to proposed wilderness (LUD 1). Effects of implementation were displayed in tables showing the number of VCU's assigned to the different LUD ratings. The Plan also displayed the outputs from anticipated projects following implementation of the preferred alternative in part 2 of TLMP (USDA Forest Service 1979). The Plan indicated that production from anadromous fish habitat improvement should range between a low of 263,000 pounds a year to a high of 1,516,000 pounds of fish per year. The Revision of the Tongass Land Management Plan will propose alternative measures to display outputs and effects, partly in response to new regulations of the National Forest Management Act. Effects on management indicator species (MIS) are one of these measures, as described below.

Management Indicator Species

National Forest Management Act regulations direct the use of management indicator species (MIS) in forest planning to help display the effects of forest management. Because TLMP was approved prior to the NFMA regulations requiring

Management Indicator Species. MIS were not required for the 1979 TLMP. MIS are vertebrate or invertebrate species whose population changes are believed to indicate the effects of land management activities. Through the use of MIS, the total number of species that occur within a planning area is reduced to a manageable set of species that represents collectively the complex of habitats, species, and associated management concerns.

Selection of MIS for the Tongass Forest Plan Revision was a two step process. First, the Alaska Region cooperated with the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Services to identify MIS for National Forest Lands in Alaska (Management Indicator Species for the National Forest Lands in Alaska, Sidle and Suring 1986). Six species of fish and one invertebrate were recommended as MIS for all levels of planning on the Tongass National Forest. These were pink, coho, sockeye and king salmon, cutthroat and steelhead trout, and butter clam.

Second, the Revision interdisciplinary team, in conjunction with the Tongass Forest Supervisors and agencies participating in the first step of MIS identification, further evaluated and refined the MIS for the Revision. For fish, it was agreed that pink salmon, coho salmon and Dolly Varden char would best represent management activities forest-wide. Dolly Varden char were selected to represent resident fish habitats, rather than cutthroat trout originally selected in Sidle and Suring (1986), because of their wider distribution, the better availability of data on the species' habitat requirements, and their more complete distribution over the full spectrum of resident fish habitats.

Pink salmon and coho salmon were selected to represent two different major periods of salmon life history, spawning/egg incubation and freshwater rearing. Pink salmon spawn in freshwater gravels, but juveniles, immediately upon emergence from the gravels, go to sea. Therefore, spawning gravel quantity and quality limits pink salmon freshwater habitat capability. Coho salmon also spawn and incubate in freshwater, but after emergence from the gravels, juveniles stay (rear) in freshwater for 1 to 3 years. After attaining a size of about 4 to 6 inches, the juvenile coho migrate from freshwater to the ocean. Typically, it is the period of fresh water habitation that limits the coho freshwater habitat capability. Therefore, the use of coho and pink salmon as Management Indicator Species, gives representation to both spawning and rearing freshwater habitats.

The three MIS species are illustrated in figure 3-9. Other species listed in Management Indicator Species for the National Forest Lands in Alaska (Sidle and Suring 1986) should still be used, where appropriate, at other planning levels.

SUPPLY/INVENTORY EXISTING

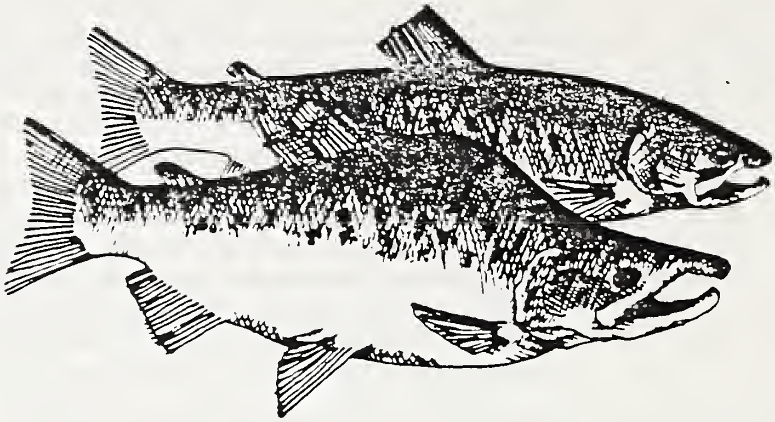
Existing populations and use of fish and aquatic resources are displayed in this section in five ways: 1) subsistence harvest estimates, 2) commercial fish harvest, 3) sport fishing use, 4) hatcheries, aquaculture and fishery enhancement projects, 5) fish habitat values, and 6) value of estuaries, including resource presence and fisheries.

Subsistence Fish Harvest

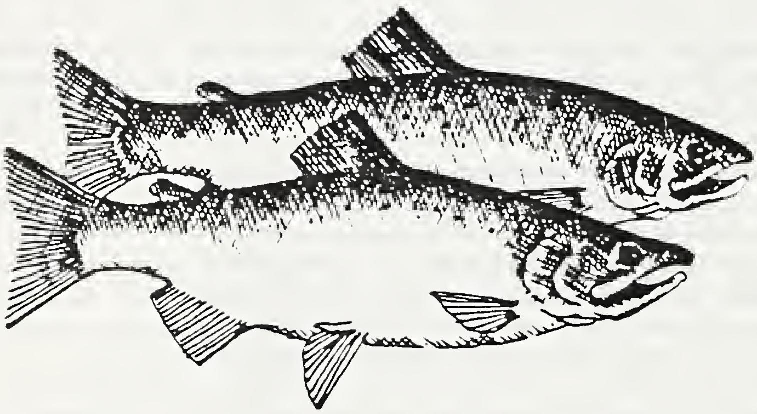
Subsistence fish harvest on the Tongass National Forest is described in detail in the subsistence portion of this document. In this section, only the statistics concerning numbers of subsistence fish harvested are shown. Table 3-25 shows the reported subsistence salmon harvest by species under subsistence permits issued between 1967 and 1987 for all of Southeast Alaska, as obtained

FIGURE 3-9

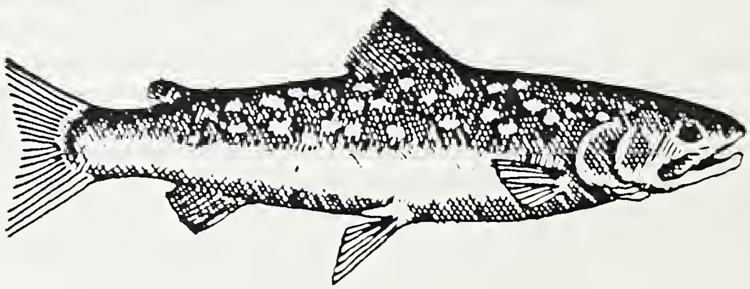
MANAGEMENT INDICATOR FISH SPECIES FOR THE TONGASS



PINK SALMON



COHO SALMON



DOLLY VARDEN CHAR

from the Alaska Department of Fish and Game. Figure 3-10 shows this same information in graphical form. From this figure, it is evident that sockeye salmon is the most harvested species, followed by chum, pink, coho and king salmon. The largest reported subsistence salmon harvest totaled 44,203 fish in 1982. Harvest since 1980 has been somewhat higher than in the prior years, but the reason for this is not easily determined. Two possiblities are that a larger number of fish may be available for harvest, or that there was a change in reporting requirements.

TABLE 3-25
SUBSISTENCE SALMON HARVEST IN SOUTHEAST ALASKA, 1967-1987 (Numbers of Fish)

Year	King	Sockeye	Coho	Pink	Chum	Total
1967	6	7,238	489	482	4,059	12,274
1968	62	8,382	624	1,328	4,260	14,656
1969	9	6,305	70	1,771	3,180	11,335
1970	13	10,751	0	2,246	2,415	15,425
1971	0	9,598	0	3,648	6,123	19,369
1972	10	9,098	0	1,253	3,970	14,331
1973	6	7,584	63	2,675	6,799	17,127
1974	6	7,822	61	2,690	6,819	17,398
1975	27	9,964	136	11,428	5,277	26,832
1976	83	10,685	64	1,590	3,594	16,016
1977	92	7,726	849	1,963	3,007	13,637
1978	59	11,532	969	4,832	3,150	20,542
1979	238	17,603	780	5,585	4,001	28,207
1980	324	22,547	1,517	1,439	3,741	29,568
1981	168	21,220	1,830	6,065	4,512	33,795
1982	206	33,762	2,279	4,239	3,717	44,203
1983	226	17,052	571	1,859	2,559	22,267
1984	288	20,094	1,293	2,560	2,502	26,737
1985	247	26,063	422	2,074	2,815	31,621
1986	329	23,019	863	912	2,722	27,845
1987	406	28,830	996	1,503	3,706	35,441
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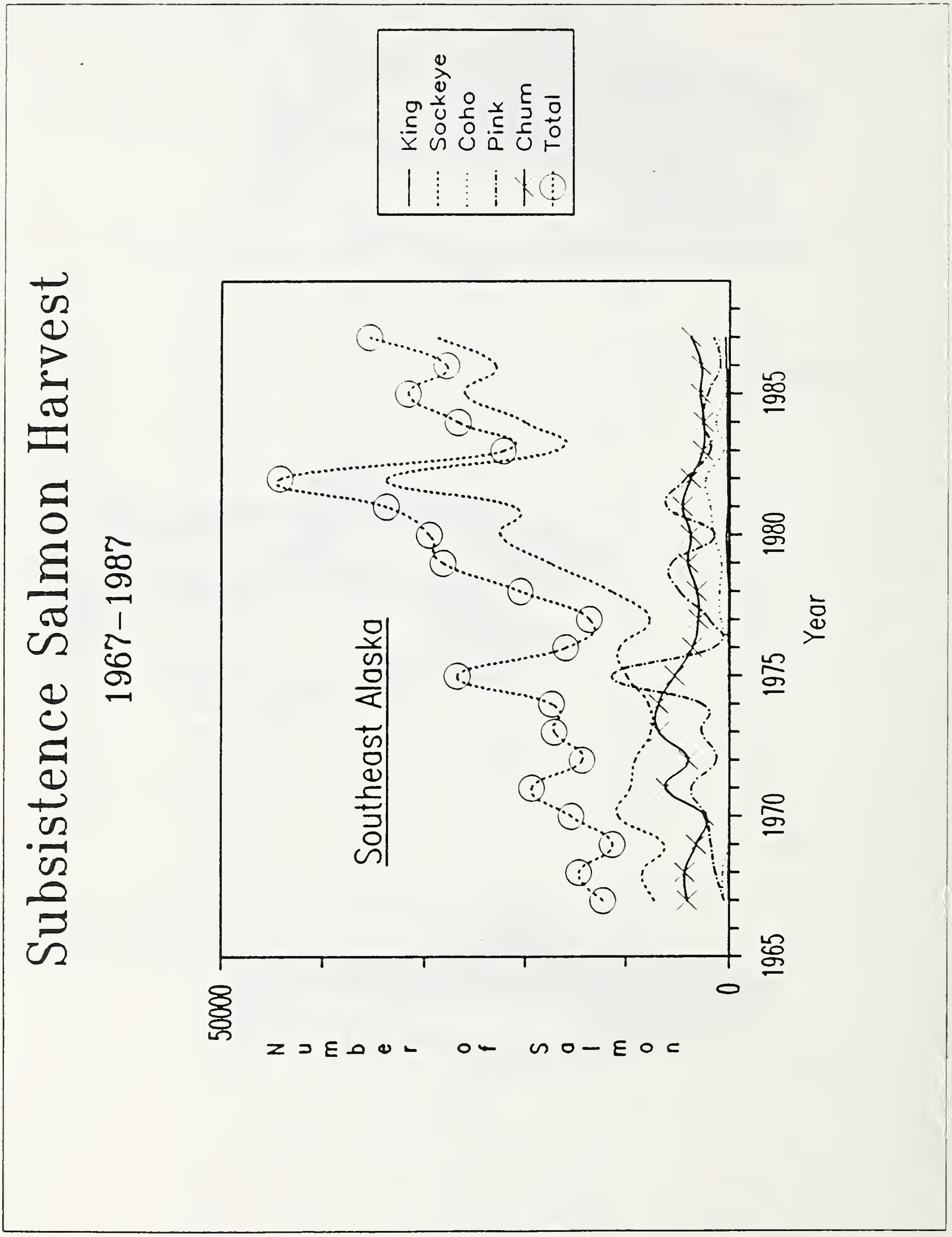
Average:	134	15,089	661	2,959	3,949	22,792

Source: Alaska Department of Fish and Game 1989e (received from Gary Gunstrom, ADF&G, Dec., 1989). Data includes only those fish harvested under subsistence permits issued by the Dept. of Fish and Game. Data from 1967 to 1975 may not include Yakutat subsistence harvest.

FIGURE 3-10
SOUTHEAST ALASKA SUBSISTENCE SALMON HARVEST 1967-1987 (Number of Salmon)



Commercial Fish Harvest

Commercial fish harvest in Southeast Alaska can be divided into two major categories: fish dependent only on marine resources, such as most bottom fish (e.g. cod and halibut) and herring; and those that are dependent on both salt water and freshwater, such as the anadromous salmon. Management of National Forest System lands primarily affects the availability of the second group, the anadromous salmon.

Salmon harvests in Southeast Alaska result from fish spawning on the Tongass National Forest, other federal lands, private lands, Canadian systems or trans-boundary river systems (such as the Alsek, Taku and Stikine). Other geographic areas of the United States, including Southcentral Alaska and the Pacific Northwest areas of Oregon, Washington and California, also contribute to the harvest. Conversely, fish spawning on the Tongass National Forest may be harvested in other geographic areas including the high seas, Canada and the Pacific Northwest. In the following presentations, it is assumed that there is a balance of harvest between those fish originating from Southeast Alaska and harvested elsewhere, and those fish originating elsewhere but being harvested in Southeast Alaska. For all salmon, this is not an equally valid assumption.

All salmon harvested in Southeast Alaska do not originate from the National Forest. It is estimated that approximately 80 percent of the commercial fish harvest results from habitats on National Forest lands, while 20 percent come from State, private, National Park Service, or other lands. The graphs and chart that follow explicitly state whether the numbers represent all of Southeast Alaska, or only the Tongass National Forest.

Table 3-26 shows the pounds of commercially harvested salmon, by species, during the last ten years in Southeast Alaska, since the implementation of the Tongass Land Management Plan. Figure 3-11 presents this data graphically. This graph indicates that pink salmon is the most heavily harvested species, followed by chum, coho, sockeye and king salmon. Annual harvest fluctuations are also the greatest for species with the largest harvests. On a percentage basis, only king salmon harvests have been fairly stable over the last ten years.

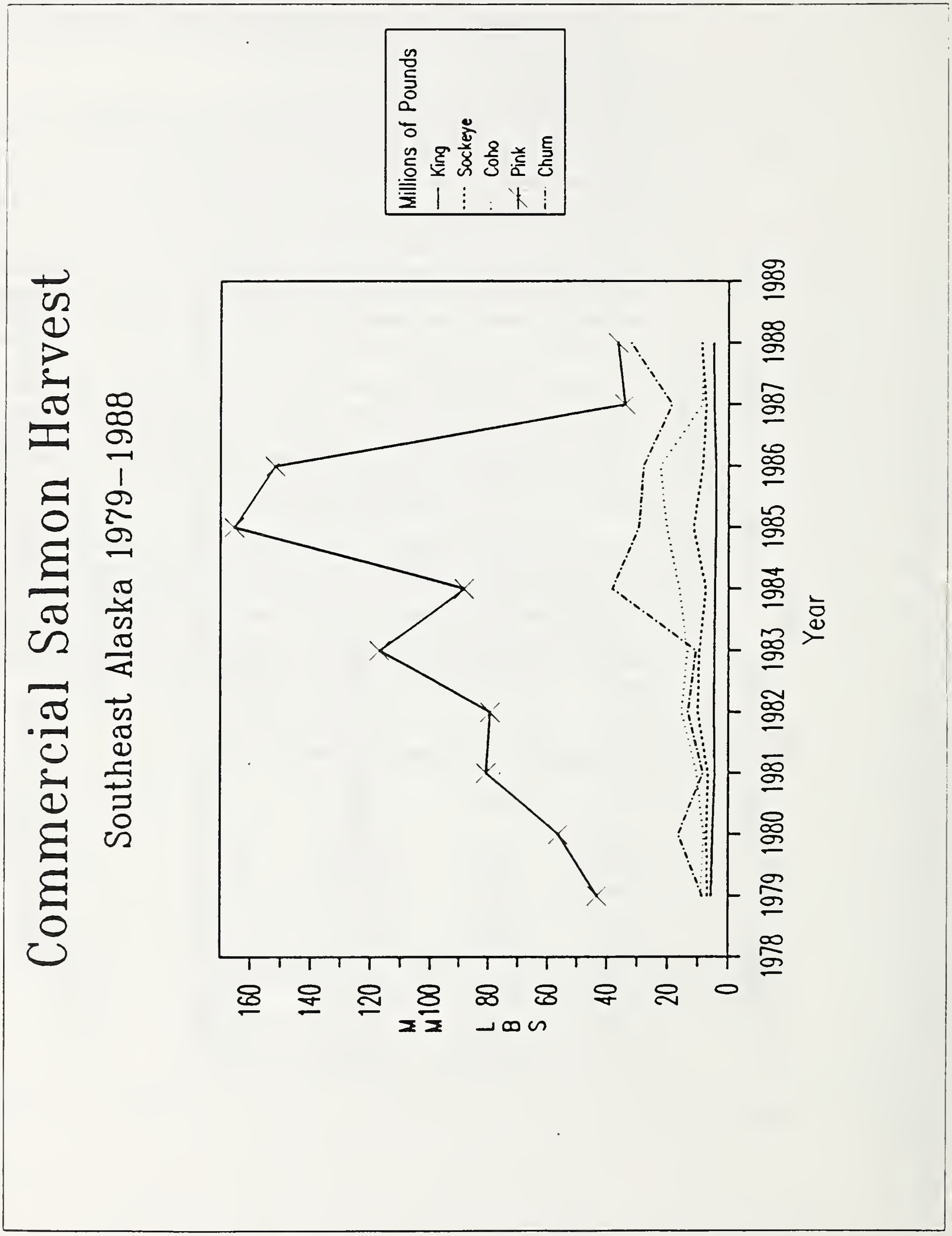
TABLE 3-26
SALMON HARVEST - Southeast Alaska (Thousands of Pounds)

Year	King	Sockeye	Coho	Pink	Chum	Total
1979	5,486	6,846	8,854	43,255	8,452	72,893
1980	5,152	7,056	8,052	56,315	16,452	93,027
1981	4,400	6,629	10,525	80,784	8,380	110,718
1982	4,660	10,040	15,459	79,455	13,377	122,991
1983	4,627	9,549	13,672	117,133	10,695	155,676
1984	4,370	7,482	16,241	88,450	38,303	154,846
1985	4,070	11,512	20,384	165,499	29,559	231,024
1986	4,012	8,391	22,575	151,938	28,081	214,997
1987	4,707	7,326	8,677	34,052	18,770	73,532
1988	4,813	8,854	8,463	36,419	32,147	90,696

Source: See Appendix B.

FIGURE 3-11

SOUTHEAST ALASKA COMMERCIAL SALMON HARVEST VALUE, 1979-1988 (M POUNDS) 1/



To place the last ten years of fish harvest into long-term perspective, Figure 3-12 shows fish harvests Statewide and in Southeast Alaska since 1878 (Alaska Department of Fish and Game, 1989). The figure shows that the Southeast Alaska harvest of salmon peaked in approximately 1935-1940 at 50 million fish, after which there was a steady decline to less than 20 million fish in about 1950. Harvests were generally very low from 1950-1975 with a record recent low of under 6 million fish in 1975. Since 1975, there has been an increased harvest trend, including the setting of a near record in Southeast of approximately 60 million fish in 1985. In the record years, both in the past and recently, pink salmon have made up 80-90 percent of the harvest (Alaska Department of Fish and Game, 1989). Preliminary information shows that 1989 harvests may have been an all time record high.

Low salmon harvests in 1945-1955 may have been one of the contributing factors to the establishment of the long-term timber sale contracts in Southeast Alaska. Low salmon harvests may have lead to the desire to diversify the economy of Southeast Alaska. Since the harvest of large quantities of timber with the long-term timber sales began (about 1954), there have been wide fluctuations in the commercial salmon harvests. From the data presented, it is not possible to ascertain whether timber harvest has been a factor affecting the commercial salmon harvests. The limiting factors of fish production may include combinations of off-shore harvests, off-shore environmental conditions, in-stream habitat quality, in-stream natural variability (such as extreme winter freezing), effects on fish habitat due to man-caused land disturbance, and effects on fish habitat due to natural land disturbance (such as landslides). To complicate matters, the factor(s) limiting populations may change annually.

The value of the commercial harvest has varied, similar to the variations in harvest. Table 3-27 shows the value of commercial salmon harvest during the past 10 years. This information is shown graphically in Figures 3-13 and 3-14. Figure 3-13 depicts the total value of the commercial salmon harvest in Southeast Alaska between 1979 and 1988. In addition to the total value for the harvest, the value trend is also shown on the graph. Figure 3-13 indicates that there is a cyclical nature to the harvest values, while the value trend in the last ten years has been upward. Note that the trend can be somewhat misleading because the presence or absence of one year's data can significantly alter the slope of the trend line.

Figure 3-14 depicts the value of each salmon species individually. The total in any specific year is the same as shown in Figure 3-13. This table shows the greatest variation in value has been for pink salmon. In most years, pink salmon have been the most valuable species, however in 1988 the value of pink salmon was exceeded by chum salmon and very nearly equaled by sockeye salmon. On the average, pink salmon has been the most valuable species followed by coho salmon. Chum, sockeye and king salmon have had approximately the same commercial value (see Table 3-27).

FIGURE 3-12

COMMERCIAL STATEWIDE & SOUTHEAST HARVEST OF SALMON, 1878-1988 (MM FISH)

Source: Alaska Department of Fish and Game 1989.

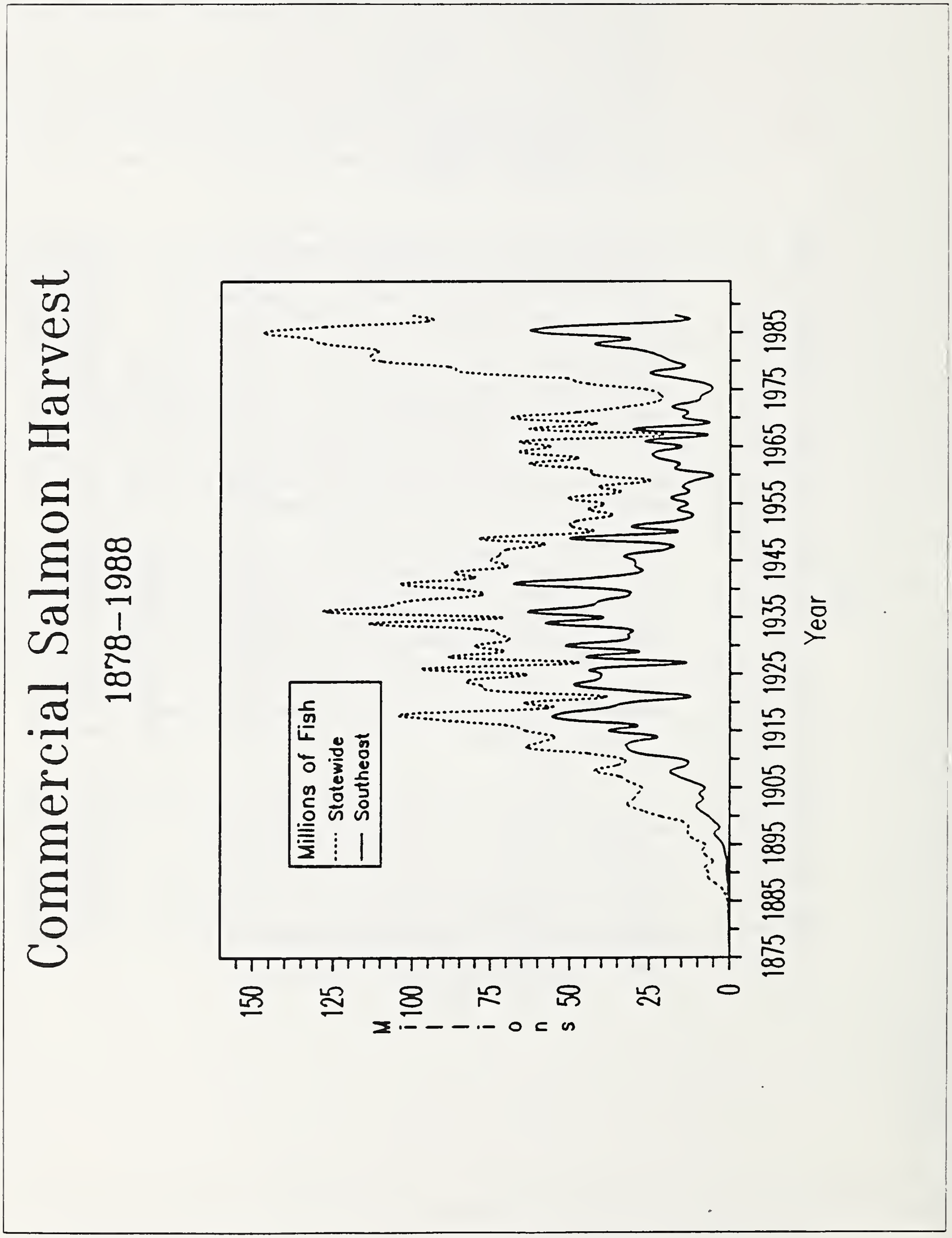
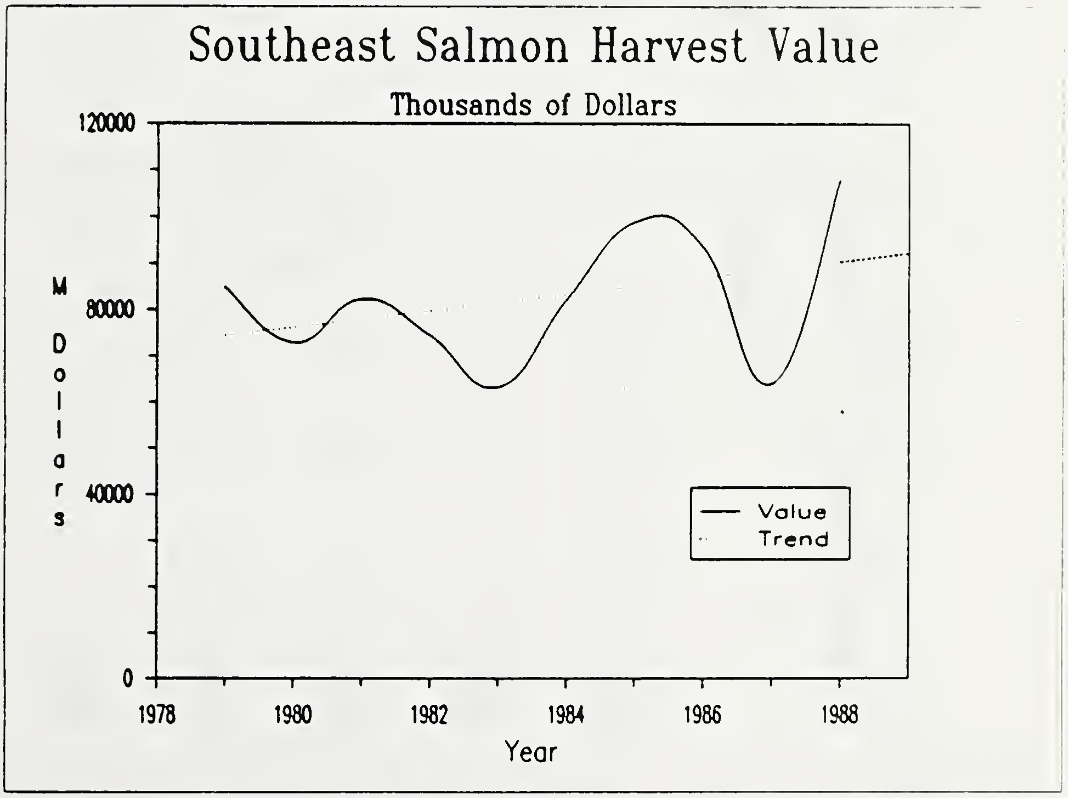


TABLE 3-27
SALMON HARVEST VALUE -- Southeast Alaska (Thousands of Dollars)

Year	King	Sockeye	Coho	Pink	Chum	Total
1979	17,196	13,829	20,566	22,772	10,522	84,884
1980	12,621	7,270	10,537	27,434	15,030	72,892
1981	12,254	10,131	14,058	40,506	5,409	82,358
1982	13,880	12,154	19,651	21,203	7,451	74,339
1983	9,043	8,503	10,159	31,337	4,275	63,318
1984	12,288	8,615	21,803	23,254	16,280	82,238
1985	9,263	15,220	21,708	39,787	12,967	98,945
1986	7,738	12,498	23,750	39,089	10,450	93,525
1987	12,153	12,500	12,866	14,128	12,476	64,123
1988	14,447	22,918	18,894	23,142	28,596	107,997
Average:	12,088	12,364	17,399	28,265	12,346	82,462

Source: See Appendix B.

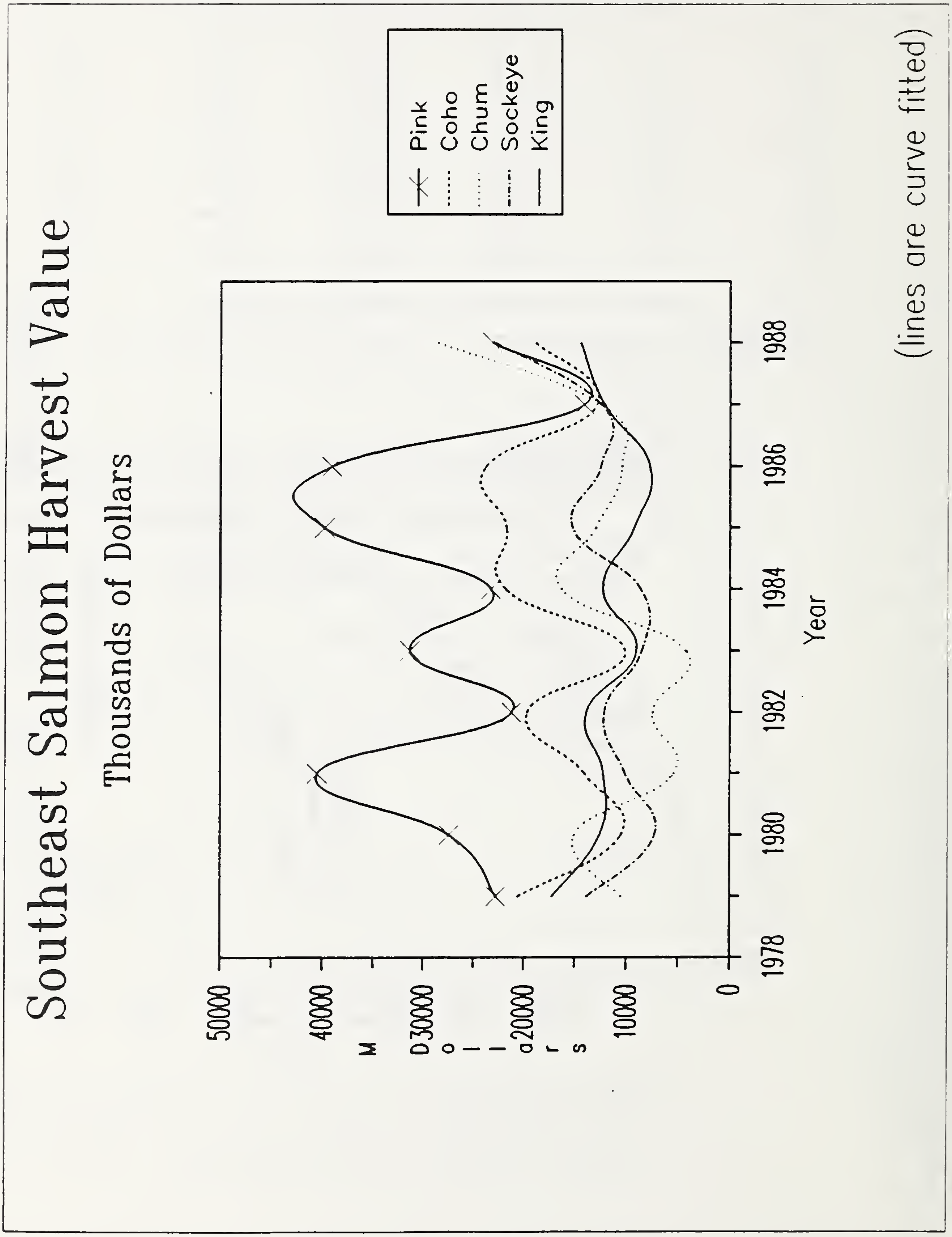
FIGURE 3-13
SOUTHEAST ALASKA COMMERCIAL SALMON HARVEST VALUE, 1979-1988 (M DOLLARS) 1/



Source: see appendix B.
1/ Total value of commercial salmon harvest in Southeast Alaska from 1979-1988, in thousands of dollars. Value line is curve fitted. The straight line indicates the trend during the period of time shown.

FIGURE 3-14

SOUTHEAST ALASKA INDIVIDUAL SALMON HARVEST VALUE, 1979-1988 (M DOLLARS) 1/



Sport Fishing Use

Approximately 18 percent of the sport fishing in the State of Alaska occurs in Southeast. Of this, approximately 85 percent occurs in the vicinity of the Tongass National Forest (calculated from Mills, 1987). Sport fishing targets freshwater resident, marine, and anadromous species. Although recreationists often use the National Forest in some way for fishing for each type of fish, only the anadromous and resident fish may be directly influenced by activities on the National Forest. In this section, only the anadromous and resident species will be addressed.

As with commercial fishing, it is often difficult to know exactly where sport caught anadromous fish originate, whether in Canada, the Pacific Northwest, state lands, private lands, or from the National Forest. Once again, it will be assumed that fish originating from National Forest habitats, but taken elsewhere, will generally balance with those fish from other areas but taken on or near the National Forest.

Table 3-28 shows the number of fish harvested, by category, by sport fishermen in the vicinity of the Tongass's three administrative areas. The table shows that the greatest sport fish harvests are on the Chatham Administrative Area, followed by the Ketchikan and Stikine Areas. Of the fish shown, Dolly Varden char and smelt (primarily eulachon) are harvested primarily on the northern part of the Forest. Sport harvest of salmon is centered on both the northern (Chatham) and southern (Ketchikan) areas of the Forest, which reflects the population centers of Juneau and Ketchikan.

TABLE 3-28
NUMBERS OF FISH HARVESTED BY SPORT FISHERMEN, BY CATEGORY, IN AREAS OF SOUTHEAST ALASKA 1/

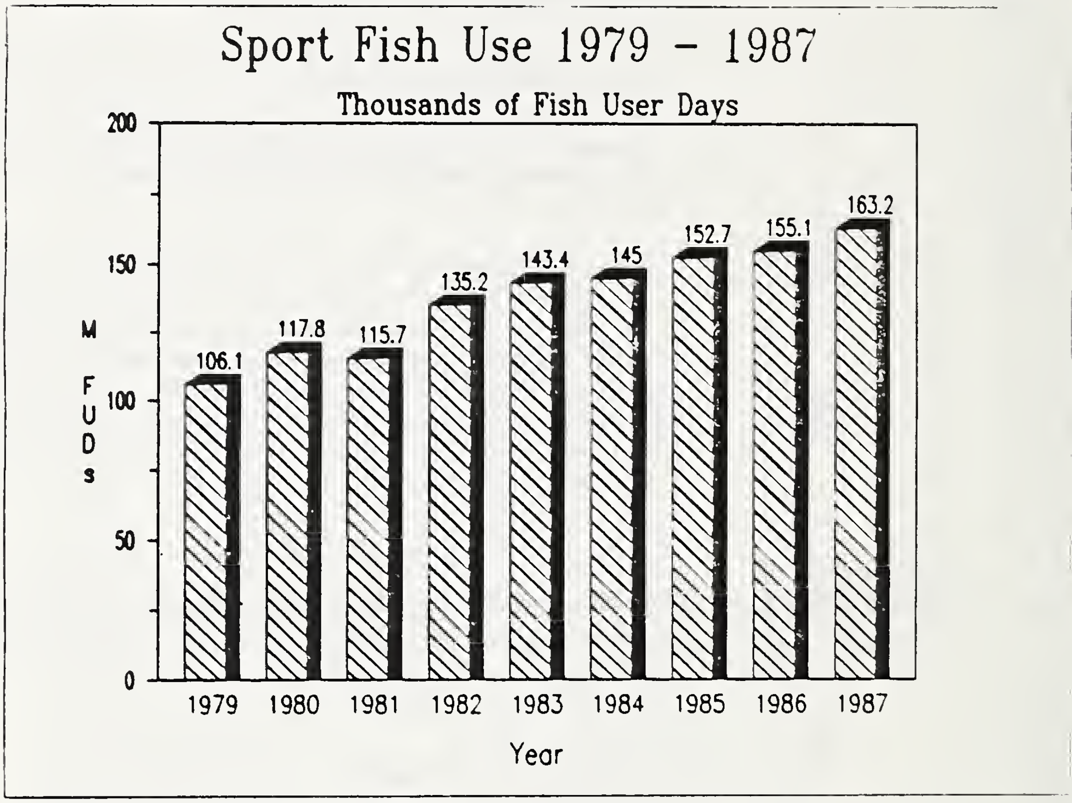
		Species						
Area	Year	Dolly Varden Char	Coho Salmon	Pink Salmon	All Anadromous Salmon	All Fish No Smelt	Smelt	All Fish
Chatham	1984	15,060	24,996	13,687	56,269	132,752	12,712	145,464
	1985	20,537	29,995	38,729	84,357	158,979	35	159,014
	1986	16,598	23,466	12,877	48,877	110,154	1,845	111,999
Stikine	1984	4,623	4,046	1,699	9,487	30,852	0	30,852
	1985	1,109	1,580	2,619	8,553	19,987	0	19,987
	1986	3,405	2,215	488	6,878	28,477	1,549	30,026
Ketchikan	1984	4,392	28,783	21,224	57,889	115,014	0	115,014
	1985	7,003	25,111	19,277	53,351	127,158	0	127,158
	1986	7,553	29,830	18,382	59,097	127,897	0	127,897

1/ The data represents only sport fishing on the Tongass National Forest. Haines-Skagway and Glcier Bay Census Areas are not represented in this data. Individual species totals are shown for management indicator species and smelt.

Source: Database queries from the Alaska Statewide Sport Fisheries Harvest Report, Alaska Dept. of Fish and Game, Michael J. Mills, November, 1987. Obtained with the assistance of Mark Schwan, Alaska Dept. of Fish and Game, Southeast Regional Office, 1989.

The numbers of fish harvested represent efforts by sport fishermen. This is adjusted, for Forest Service use, into Fish User Days (FUD's) which each represent 12 hours of fishing. All recreation use figures in this document are in user days. Figure 3-15 shows the number of FUD's attributable to the National Forest from 1979 to 1987. Except for a small decrease in 1981, sport fishing has consistently increased every year since implementation of the Tongass Land Management Plan in 1979. Appendix B includes an analysis of the current value of a Fish User Day.

FIGURE 3-15
TONGASS NATIONAL FOREST SPORT FISH USE, 1979-1987 IN THOUSANDS OF FISH USER DAYS



Source: Alaska Statewide Sport Fisheries Harvest Report, Alaska Dept. of Fish and Game, Michael J. Mills, November, 1987.

Hatcheries, Aquaculture and, Fishery Enhancement Projects

A variety of aquaculture projects, including hatcheries and fishery enhancement projects, have been developed on the Forest. Coordination and construction of projects to meet fisheries goals occurs at multiple levels and by a number of different organizations. The overall coordinating group for fisheries enhancement and development are the Regional Planning Teams. Three groups cover the Tongass National Forest: the Northern Southeast Regional Planning Team, Southern Southeast Regional Planning Teams (RPT's), and the Yakutat Salmon Planning Group. These groups are coordinated by the Alaska Department of Fish and Game, Division of Fisheries Rehabilitation, Enhancement and Development (FRED). Groups implementing aquaculture projects include the State of Alaska, private non-profit aquaculture organizations, the Northern and Southern Regional Aquaculture Associations, the USDA Forest Service, and additional cooperators.

Some examples of these cooperators include: local communities, pulp companies, and many others.

Comprehensive Salmon Plans have been developed for three areas of Southeast Alaska, including Northern Southeast, Southern Southeast, and Yakutat (Alaska Department of Fish and Game 1984; Joint Southeast Alaska Regional Planning Teams 1981; Northern Southeast Regional Planning Team 1982-present; Southern Southeast Regional Planning Team 1983-present). These documents include enhancement goals and attainment strategies. (The goals are displayed in the demand portion of this section.) Projects proposed to implement the strategies are also included in some of these documents.

The Alaska National Interest Lands Conservation Act (ANILCA) Section 507 (b) states:

> "Each subsequent revision of National Forest management plans under the Forest and Rangeland Renewable Resources Planning Act of 1974 and the National Forest Management Act of 1976 shall contain a report on the status of the planning process undertaken under this paragraph, including, but not limited to, a description of current hatchery and aquaculture projects, an analysis of the success of these projects, and a prioritized list of projects anticipated for the duration of the management plan. The report shall be submitted by the Secretary to the Congress with recommendations for any legislative action which the Secretary may deem necessary to implement the proposed hatchery and aquaculture projects."

The report required by ANILCA Section 507 (b) will be included in a future planning document. The status of current and completed projects follows.

Table 3-29 lists hatchery projects constructed on the National Forest including a listing of their planned production capability, owner and operator of the facility, and an estimate of the production actually attained. Table 3-30 lists non-hatchery aquaculture projects on the National Forest since the implementation of the Tongass Land Management Plan (1980-1989), including fishway construction, large woody debris enhancement, lake fertilization and lake stocking, among others.

TABLE 3-29
HATCHERY PROJECTS ON NATIONAL FOREST SYSTEM LANDS

			Planned Production2/					Actual Production2/				
Hatchery	Location	Owner1/	KS	SS	RS	PS	CS	KS	SS	RS	PS	CS
INFORMATION NOT AVAILABLE AT THIS TIME												

Source: (to be received from Regional Office)
1/ Owner/operator codes: SA = State of Alaska; NS = Northern Southeast Regional Aquaculture Association; SS = Southern Southeast Regional Aquaculture Association; NM = National Marine Fisheries Services; FWS = U.S. Fish and Wildlife Service; others.
2/ Average production, in thousands, during the period 1979-1988. If the project was built after 1979 or did not come into full production until after 1979, this number represents the period of time for which data is available. Data for less than a three year period is designated with a "*". KS = king salmon; SS = coho salmon; RS = sockeye salmon; PS = pink salmon; and CS = chum salmon.

The Tongass Land Management Plan includes one management output displayed for fish resource: Fish Habitat Improvement - anadromous. This is the estimated increase in fish habitat capability (measured in pounds of fish) as the result of implementing anadromous fish habitat improvement projects. It is presented as an average annual output ranging from 263,000 pounds to 1,516,000 pounds. A summary of the projects completed between 1980 and 1987 is shown in Table 3-30. The table shows that an estimated potential production of more than 7 million pounds of fish can be attributed to the 74 fisheries enhancement projects that had been completed by the end of 1987. The estimated average annual potential production during this period was about 3-4 million pounds. This is roughly twice the high average annual output estimated in TLMP and reflections the emphasis that has been placed on fish habitat improvement.

TABLE 3-30
FISHERIES ENHANCEMENT PROJECTS COMPLETED 1980-1989

Enhancement activity	# projects1/	Production (m LBS/yr)2/	Cost (m $) Federal3/	Cost (m $) Other4/
Fishways	18	1,639.4	2,218.8	120.0 5/
Falls modification	3	49.8	68.0	0.0
Spawning channel	2	157.6	203.5	25.0
Debris removal	10	76.0	19.0	0.0
Lake fertilization	4	3,160.0	787.0	1,206.0
Lake stocking	4	1,242.0	510.3	1,070.3
Stream stocking	16	484.7	51.0	26.0
Rearing pond con.	4	12.1	66.6	0.0
Large woody debris mngmt.	10	46.6	305.9	0.0
Fish weir	3	NA	0.0	NA
TOTALS	74	7,169.4	4,230.1	2,447.3

Source: USDA Forest Service, Alaska Regional Office. Obtained from Ron Dunlap, Wildlife and Fisheries.
abbreviations: NA = not available; # = number; m = thousand
1/ The project totals represent the number of activities completed at different locations. Repetitive annual investments at the same site (i.e. fertilizer applied to each lake annually) are not show, although the costs of the repetitive treatments have been included in the cost totals.
2/ Salmon production based on full utilization of habitat capability. The time it will take to reach full production varies with the species and fisheries management strategies regulating the fish stocks returning to the projects.
3/ Costs shown in the table are direct costs (i.e. construction) and do not include indirect costs such as program planning, additional contracts for engineering, and other project development costs.
4/ Combined investments of the Alaska Dept. of Fish and Game and the Regional Aquaculture Associations. Cooperative investment information for the majority of projects involving these agencies was not available.
5/ Construction funds only. Alaska Dept. of Fish and Game salmon broodstock development costs associated with some fishway projects were not available.

Table 3-30 indicates that 74 projects have been completed between 1980 and 1989 on the Tongass National Forest. Of these, the greater part have been fishways and stream stocking, with the largest outputs anticipated from lake fertilization fishways and lake stocking projects. The majority of federal funding has been spent on the construction of fishways, while the bulk of the non-federal (state and aquaculture association) spending has been for lake fertilization and lake stocking. (For further discussion, see the section on results of TLMP implementation, near the end of this fish section.)

Prior to 1980, a considerable number of additional projects were implemented on the Tongass National Forest, but these have not been specifically compiled or analyzed for this document (see Sweet 1975).

Fish Habitat Values

For the Tongass Land Management Plan, the Forest was divided into 867 Value Comparison Units (VCU's). (A VCU is a distinct geographic area generally encompassing a drainage basin containing one or more large stream systems. Boundaries usually follow easily recognizable watershed divides. The VCU's average about 18,000 acres.) For each VCU, resource values were assessed for sport fish and commercial fish (USDA Forest Service 1978).

The values do not specifically measure habitat capability (the capability of a stream to produce fish, given the maximum number of fish needed to seed it), but rather represent actual average number of adult fish, diversity of fish species, and special values associated with the VCU. The values for sport fish and commercial fish have been updated to take advantage of the Geographical Information System now in use on the Tongass. A new rating system was developed for sport fish, based in part on the sport values developed by the Alaska Department of Fish and Game (year) in their Forest Habitat Integrity Program. Appendix XX shows the values that have been associated with streams through this updating process. (Note: all values are not available -- for the Stikine and Ketchikan Areas the values in the current Tongass Land Management Plan, as displayed in USDA Forest Service (1978), are the most accurate current values where only this information exists. Appendix F displays these values, as well as the Forest Habitat Integrity Values.)

Estuarine habitat Values

Estuary habitat values were also developed in the Tongass Land Management Plan (USDA Forest Service 1978). These values have been updated to indicate changes in disturbance to estuaries, harvest of estuarine-dependent resources, and other new information about the estuaries. These updates were done by the National Marine Fisheries Service and the U.S. Fish and Wildlife Service. In some cases, the data sheets for individual VCUs used in the formulation of USDA Forest Service (1978) could not be traced. For these VCUs, the original rating is recorded in the planning record.

POTENTIAL

Channel Inventories

Perennial streams on the Tongass National Forest, outside of most wilderness, have been inventoried and assigned a channel type designation. (See water section of this chapter for a discussion of channel types.) Individual channel types have fairly consistent physical and biological characteristics (Marion et al. 1987). The channel types provide a system to inventory the amount and quality of fish habitat and can be used to predict their physical response and sensitivity to different management activities. The channel types have been stratified into distinctly different groups, called "stream process groups" (table 3-31).

TABLE 3-31
CHANNEL TYPES ASSIGNED TO PROCESS GROUPS

Stream Process Group	Channel Types
Low Gradient Floodplain	B1,B8,C1,C3,C4,C6,D4,D5
Alluvial Fan	A3,B5,D1,D6
Mixed Control Moderate Gradient	B2,B3,D3
Large Low Gradient Contained	C2,C5
Moderate Gradient Contained	B4,B6
High Gradient Contained	A1,A2,A4,A5,A6,A7,B7,D2,D7
Placid or Glide Streams	L1,L2
Lakes and Ponds	L,L3,L4,L5
Estuarine	E1,E2,E3,E5

The nine stream process groups are described below, followed by illustrations of each group (except lakes and ponds in figures 3-16(A), (B) and (C).

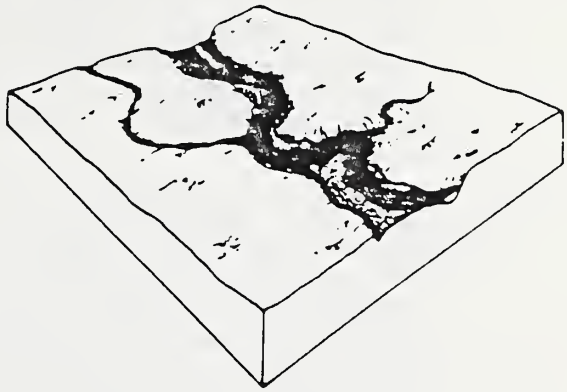
Low Gradient Floodplain Channels. These channels with less than two-percent slopes have primarily alluvial deposits. Alluvial deposits include fine sediments and small gravel and cobble deposited by streams. High stream flow typically overflow the stream bank. Due to closeness to saltwater, low water velocity, and combinations of pools, riffles, and large woody debris, low gradient floodplain channels provide high quality spawning and rearing habitat. Riparian areas may extend well beyond 100 feet from the streambank.

Alluvial Fan Channels. Alluvial fan channels generally slope less than five percent and are strongly influenced by deposits of alluvial sediments. These streams are located on footslope landforms in a transitional area between valley floodplains and steep mountain slopes. When the streamflow slows down as in the transition from mountain slope channels to the low gradient floodplain, cobbles and coarse gravel are deposited. These transition streams are called alluvial fan channels. Alluvial fan channels frequently change course; the stream network they create is often multi-branched. These stream channels are often unstable and water flow may be intermittent during the summer and winter months limiting their use for rearing coho salmon and resident trout. High energy water flow, and the large amount of coarse gravel moving through these channels, makes spawning gravel unstable. Spawning and rearing habitat for coho and pink salmon improves as the stream gradient of alluvial fan channels decreases. Channels with abundant large woody debris are moderate to high value for coho spawning and rearing. Riparian areas for these types of alluvial channels can be extensive because of the complex stream network.

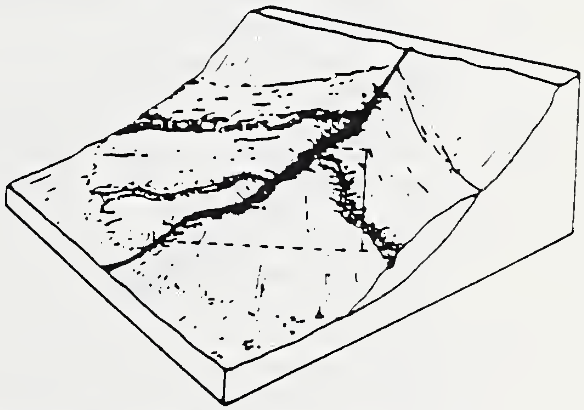
Mixed Control, Moderate Gradient Channels. Channel bed slopes for these channels range up to five percent. Streambanks are generally boulders and bedrock. When an increased volume of water is introduced into these streams, they do not overflow, stream course migration is limited, and floodplains do not develop. Sediment deposit is minimal, due to water velocity and the slope of the streambed. Moderate gradient, mixed control channels provide a variety of habitats. If there are large woody debris accumulations in streams, they lend themselves to rearing habitat, particularly as coho salmon winter refuge. Riparian areas for this channel type are generally narrow and discontinuous.

FIGURE 3-16(A)
STREAM PROCESS GROUPS

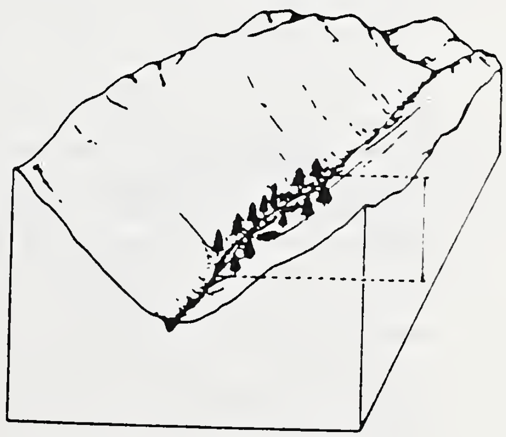
Low Gradient Floodplain Channels



Alluvial Fan Channels



Mixed Control, Moderate Gradient Channels



Moderate Gradient, Contained Channels. Streamflow is completely contained by adjacent landforms and channel banks with streambank and bed erosion frequently influenced by bedrock outcrops. Deposit of sediment is very limited in the channels themselves, although they transport and deposit sediment downstream very efficiently. Moderate gradient, contained channels include limited amounts of anadromous fish habitat. Access to spawning gravel may be limited; so may the existence of spawning-sized gravel. Only stream sections with accumulations of large woody debris are suitable as rearing habitat, particularly winter refuge habitat. Riparian areas are generally less than 100 feet wide on either side of the stream.

Low Gradient, Contained Channels. Stream flow in these channels is well contained by adjacent landforms. These larger valley or lowland streams often have banks with very little alluvial sediment deposit. The low gradient, contained channels include habitat for large numbers of spawning pink salmon, particularly in lower stream segments with large accumulations of spawning gravel. Rearing habitat, particularly winter refuge habitat, is limited to stream sections with accumulations of large woody debris. Riparian areas are discontinuous and generally less than 150 feet wide.

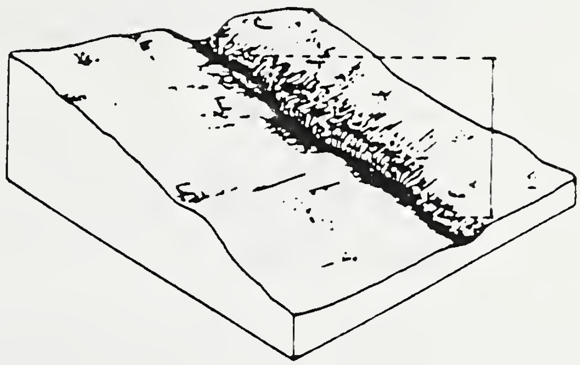
Placid/Glide Channels. Placid and glide channels are very low gradient channels (less than one percent slope) associated with low relief landforms and wetlands. Water movement is slow and sediment transport low with channels acting as traps and storage areas for fine organic and inorganic sediments. Channel banks are generally stable and gravel bars are absent. These channels have high habitat capability for coho salmon. Although spawning gravels are not abundant, they are usually sufficient to produce enough juvenile fish to fully use the habitat available. These channels provide summer coho rearing habitat, but they lack sufficient pools to provide quality "overwintering" habitat. Due to upstream lake waters moderating their temperatures, lake outlet channels provide good overwintering habitat. Better rearing habitat, particularly winter refuge habitat, is tied to undercut banks. The long-term maintenance of much of the coho salmon rearing and spawning habitat is controlled by large woody debris. Placid or glide streams are frequently used by spawning pink salmon. Riparian area size is highly variable but may encompass very large wetlands.

Ponds and Lakes. These channel types consist of lakeside and pond areas. Lakes contain valuable aquatic habitat for some fish species, primarily sockeye and coho salmon, and resident trout. Some channels are associated with beaver ponds.

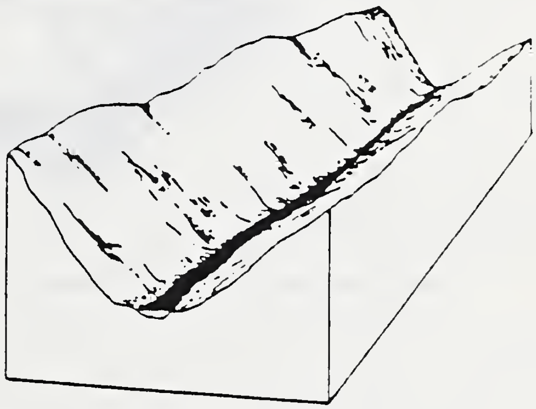
Estuarine Channels. This process group includes all intertidal streams. These streams are directly influenced by tidal inundation. Stream stage fluctuations, channel structure, sediment transport and water chemistry are all characteristics that are influenced to some degree by salt water inundation in these channel segments. Estuarine channels are associated with salt water marshes, meadows, mudflats, and gravel deltas that are all predominantly depositional environments. The habitat quality for fish depends on the streambed stability. Where gravels exist in estuarine channels, they provide excellent pink salmon spawning gravel. Important rearing habitat is also provided by these channels, although rearing is often reduced during the winter months. Riparian areas associated with estuarine channels may encompass an entire estuarine wetland system.

FIGURE 3-16(B)
STREAM PROCESS GROUPS

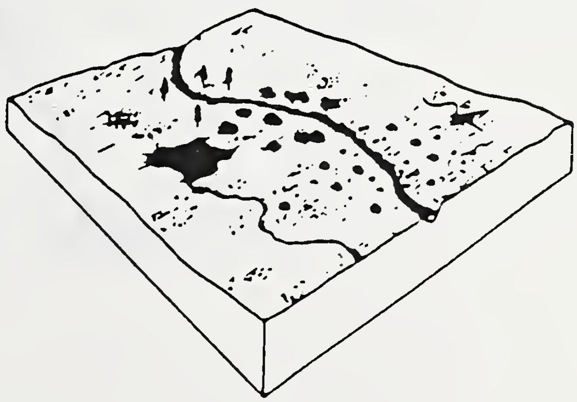
Moderate Gradient, Contained Channels



Low Gradient, Contained Channels



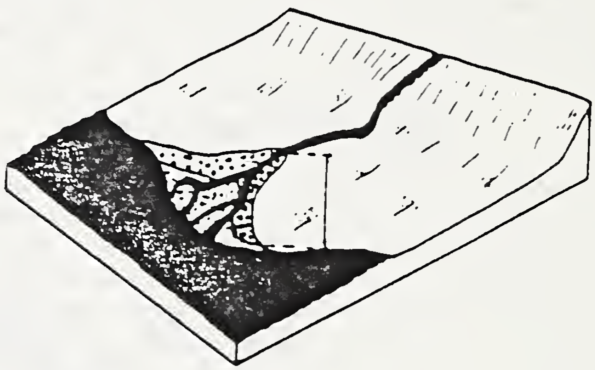
Placid/Glide Channels



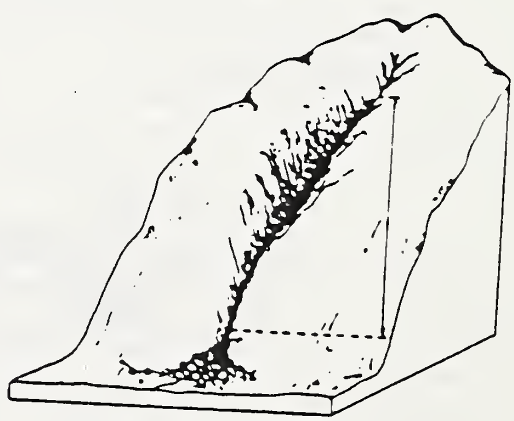
High Gradient, Contained Channels. This process group includes moderate to deeply incised, high gradient, mountainslope streams. The areas surrounding these channels are primary sediment sources. Relatively high stream energy enables streams to transport large sediment loads during sudden increases in streamflow. High gradient, contained streams are not generally producers of anadromous fish as waterfalls and cascades may block access to upper stream reaches. Resident fish production is limited by lack of high quality rearing pools. High gradient stream riparian areas usually extend to the upper stream bank slope break.

FIGURE 3-16(C)
STREAM PROCESS GROUPS

Estuarine Channels



High Gradient, Contained Channels



Stream Class Inventories

In addition to channel type, most streams have been categorized by stream class. As with channel typing, the exceptions are streams in some wilderness areas. Three stream classes have been identified: I, II, and III. These stream classes correspond to the Aquatic Habitat Management Units (AHMU) identified in the Forest Service's Aquatic Habitat Management Handbook, FSH 2609.24 (USDA Forest Service 1986) and the Fish Habitat Management Units described in the Alaska Regional Guide (USDA Forest Service 1983). They are defined as follows:

Class I: Streams with anadromous (fish ascending from oceans to breed in freshwater) or adfluvial (fish ascending from freshwater lakes to breed in streams) lake and stream habitat. Also included is the habitat upstream from migration barriers known to be reasonable enhancement opportunities for anadromous fish and habitat with high value resident sport fish populations.

Class II: Streams with resident fish populations and generally steep (often 6-15 percent) gradient (can also include streams from 0-5 percent gradient where no anadromous fish occur). These populations have limited sport fisheries values. These streams generally occur upstream of migration barriers or are steep gradient streams with other habitat features that preclude anadromous fish use.

Class III: Streams with no fish populations but have potential water quality influence on the downstream aquatic habitat.

Stream classes are used: 1) to establish the number of miles of different streams which provide fish habitat, 2) to help quantify the amount of timber harvest available from the riparian area resulting from the application of different management prescriptions and alternatives, and 3) to facilitate Forest Plan implementation.

Table 3-32 displays, by Administrative Area of the Tongass, the estimated miles of streams by process group and stream class. The table shows that the Chatham Area has the greatest number of total miles, followed by the Ketchikan and Stikine Areas. Analysis of the distribution of process group miles between the three Areas shows a large difference between Areas. For instance, Chatham has almost twice the number of Large Low Gradient Floodplain miles that Ketchikan has; but, Ketchikan has almost twice the number of miles of Mixed Control Moderate Gradient than Chatham. These differences affect the habitat capability values calculated for the three Areas.

Fish Habitat Capability

The evaluations for each of the Management Indicator Species (MIS), pink and coho salmon and Dolly Varden Char, occurs in two steps. First, the potential habitat capability of Forest habitats is estimated. Second, estimates of the effects of management activities, such as timber harvest and roads, on the potential habitat capability are made.

TABLE 3-32
MILES OF STREAMS BY AREA, PROCESS GROUP AND STREAM CLASS 1/

Stream Process Group	Class	Chatham	Stikine	Ketchikan	Total
Low Gradient Floodplain	I	2,595	963	1,368	4,926
	II	84	188	15	288
	III	2	14	13	28
Alluvial Fan	I	517	58	140	715
	II	764	100	193	1,057
	III	115	98	30	243
Mixed Control Moderate Gradient	I	837	1,327	1,519	3,684
	II	502	357	83	942
	III	0	34	67	100
Large Low Gradient Contained	I	286	164	222	672
	II	14	28	0	42
	III	0	0	0	0
Moderate Gradient Contained	I	595	466	978	2,039
	II	173	206	114	493
	III	0	37	83	120
High Gradient Contained	I	24	107	53	184
	II	3,489	914	2,176	6,578
	III	7,477	4,856	5,515	17,847
Placid or Glide Streams	I	427	285	401	1,114
	II	55	55	16	127
	III	0	5	19	24
Lakes and Ponds 2/	I	162	195	155	512
	II	1	10	3	15
	III	0	0	0	1
Estuarine	1	347	157	173	677
	II	0	0	0	0
	III	0	0	0	1
Administrative Area Totals:	I	5,790	3,724	5,009	14,523
	II	5,082	1,859	2,601	9,542
	III	7,594	5,043	5,727	18,364
		------	------	------	------
GRAND TOTAL (miles) -- all streams:		18,466	10,626	13,337	42,429

Source: Channel type inventories and the GIS database.
1/ Miles are adjusted for: 1) the uninventoried wilderness areas on the Forest (made by determining comparable geographical areas, then prorating stream miles on a per-area basis, and 2) an estimate of the stream miles missed from the channel inventories. Additional unmappable streams are present, but undetectable except with detailed on-the-ground surveys. These streams cannot be mapped within the tolerances of the channel type inventory.
2/ Some small lakes and ponds are classified as stream channels in the inventory.

Habitat capability is the carrying capacity: the maximum number of fish the habitat can produce. Population is the actual number of fish present at a given time. Populations tend to fluctuate naturally due to a wide range of factors, including harvest, climate, and species interactions, while habitat capability tends to be relatively constant. Habitat capability, for fish, is measured in smolts (the life stage of a fish that migrates from freshwater to saltwater) for anadromous fish and in numbers of adult fish for resident species (fish that remain in freshwaters their entire life). Smolts are the "final" output from National Forest administered lands to the open ocean. The Forest Service has very little control of, or effect on, fish survival once fish leave the National Forest boundary. (Note: pink salmon smolts are sometimes called fry at the stage of their life when they emigrate to saltwater.)

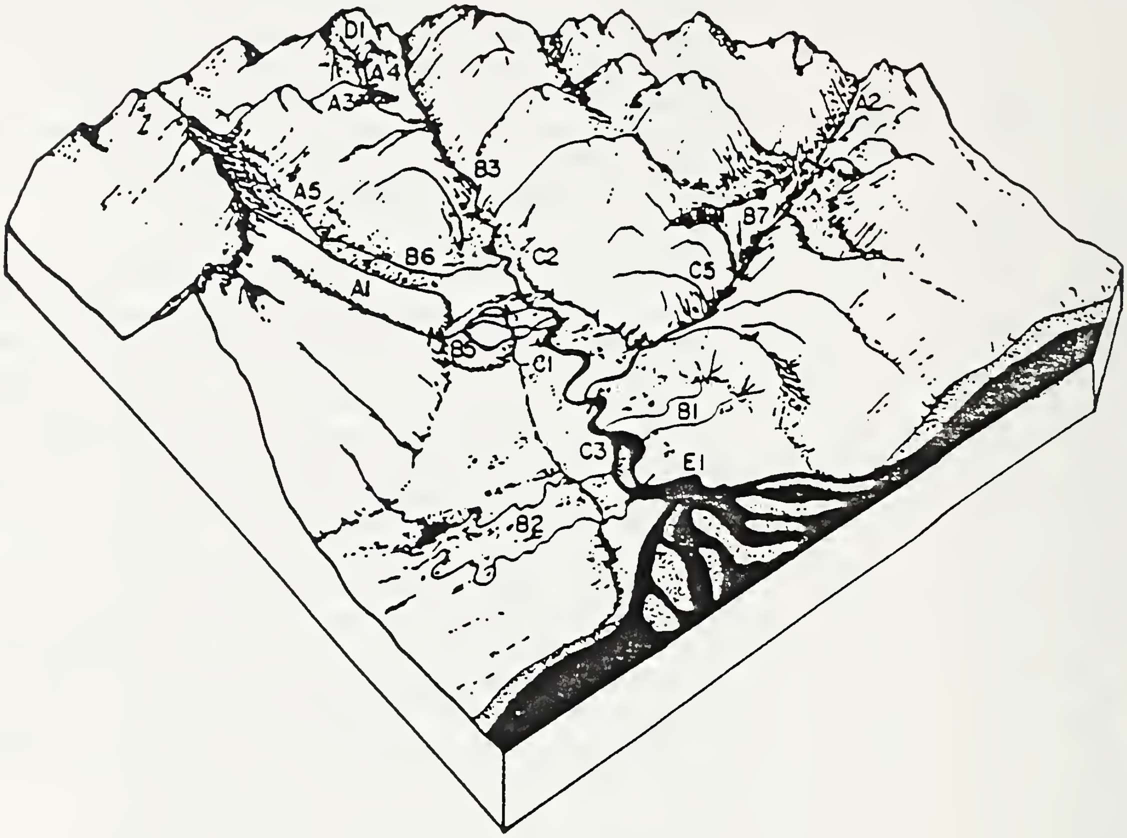
Habitat capability models were developed for the three Management Indicator Species, since intensive inventories of all Forest stream habitats are not available. The models that were developed are based on the channel type/stream class inventory. These models assume a relationship between fish habitat capability and stream physical characteristics (channel type). Streams located in the lower portions of a watershed (the C channels) typically have the highest capability. Mid-watershed channels (B channels) generally have a lower capability, while the highest gradient channels in the upper portion of the watershed (A channels) have the lowest productivity. See Figure 3-17 for an illustration of the relationship of channel types within a watershed.

The capability models are somewhat different for pink salmon than for coho salmon and Dolly Varden char. The coho and Dolly Varden models are based on numbers of rearing (stream dwelling) fish, since these two species spend a number of years in streams. The pink salmon model is based on the availability of spawning gravels since these fish emerge from the stream gravels in the spring as smolts and immediately migrate downstream to the ocean. In each case, the life stage that is considered to be limiting the amount of habitat capability is used in the model.

Data used to develop these models came from all known reliable sources of information in Southeast Alaska, including studies by the Alaska Dept. of Fish and Game, the National Marine Fisheries Service, the U.S. Fish and Wildlife Service and the U.S. Forest Service (reviewed by Mitter in 1988, with copies maintained in the Forest Planning records). For each location, where estimates of capability were made, the channel type was determined.

Further information, including the process used to derive the models and the models themselves, can be found in Appendix B of this document and in the planning records. The pink salmon, coho salmon and Dolly Varden char smolt/foot estimates for each of the channel types are shown in Table 3-33.

FIGURE 3-17
CHANNEL TYPE DISTRIBUTIONS ILLUSTRATED



Source: Marian (?) et al., 1987.

TABLE 3-33
ESTIMATES OF FISH HABITAT CAPABILITY BY CHANNEL TYPE (CT)

Process Group	CT	Pink Salmon (smolts/ft)	Coho Salmon (smolts/ft)	Dolly Varden Char (fish/ft)
Low gradient floodplain	B1	29	0.19	0.35
	B8	0	0.15	0.38
	C1	117	0.45	0.61
	C3	305	0.29	0.73
	C4	0	0.19	0.33
	C6	0	0.33	0.29

TABLE 3-33 (Continued)
ESTIMATES OF FISH HABITAT CAPABILITY BY CHANNEL TYPE (CT)

Process Group	CT	Pink Salmon (smolts/ft)	Coho Salmon (smolts/ft)	Dolly Varden Char (fish/ft)
	D4	. 0	0.00	0.41
	D5	0	0.00	0.43
Alluvial fan	A3	0	0.00	0.09
	B5	1.42	0.02	0.14
	D1	0	0.00	0.00
	D6	.13	0.00	0.03
Mixed control/moderate grad.	B2	12	0.04	0.09
	B3	28	0.10	0.83
	D3	0	0.00	0.00
Large, low grad. contained	C2	17	0.20	0.64
	C5	16	0.19	0.38
Moderate gradient contained	B4	.23	0.03	0.10
	B6	.15	0.05	0.19
High gradient contained	A1	0	0.00	0.00
	A2	0	0.01	0.31
	A4	0	0.00	0.00
	A5	0	0.01	0.33
	A6	0	0.01	0.14
	A7	0	0.01	0.16
	B7	0	0.00	0.33
	D2	0	0.00	0.00
	D7	0	0.00	0.04
Placid or glide streams	L1	0	0.52	0.71
	L2	0	0.51	1.31
Lakes and Ponds	L	0	not predicted by CT	
	L3	0	4.83	6.16
	L4	0	0.96	0.53
	L5	0	1.60	2.87
Estuarine	E1	214	0.00	0.00
	E2	17	0.00	0.00
	E3	15	0.00	0.00
	E4	0	0.00	0.00
	E5	0	0.00	0.00

Source: Population estimates made by USDA Forest Service, Alaska Dept. of Fish and Game and the National Marine Fisheries Service, with channel types determined for the sampling locations. Data documented in Mitter 1988, and methodologies in the planning records.

1/ The capability is listed in numbers of fish per foot of channel length. Appropriate factors have been used so that variable widths of the channel types have been included. in the calculation.

Habitat capability is calculated by multiplying the length of stream channels, by channel type, times the capability coefficient for that species. One important assumption in the development of the capability models is that the habitat sampled is fully seeded, or that the habitat is at its current maximum habitat capability. This is recognized as a limitation of the model, however no data currently exists to determine the model's underestimation of habitat capability. To minimize the underestimation, all population estimates used to calculate coefficients were taken only from old-growth, pristine habitats.

Habitat capability is adjusted by increases and decreases to the natural capability of the system, as shown in the following equation:

> Current capability = modeled natural capability - reductions due to habitat impacts + increases due to enhancement or mitigation

Table 3-34 shows the habitat capability predicted for the three management indicator species, by geographical zone on the Tongass, as modeled for the natural habitat capability only, i.e., with no human-related reductions or increases. The habitat capability in 1954 is assumed to be the same as natural, since no large scale timber harvest had previously occurred on the Tongass. The location and descriptions of geozones (geographical zone) are in appendix B.

TABLE 3-34
FISH HABITAT CAPABILITY ESTIMATES -- NATURAL HABITAT CAPABILITY

Geographic Zone	Pink Salmon	Coho Salmon	Dolly Varden Char
	(Thousands of Smolts)		(Thousands of Fish)
C01	12,793	38	307
C02	110,424	341	1,460
C03	5,655	37	300
C04	1,540	8	125
C05	43,783	126	543
C06	106,022	324	1,537
C07	1,623	20	44
C09	41,021	164	997
C10	83,517	413	2,249
C11	10,818	97	746
C12	75,800	333	1,582
C13	27,082	195	1,600
C14	32,218	404	1,223
C15	274,296	932	4,498
C16	1,007	15	78
C17	8,421	387	1,902
C18	42,029	158	795
C20	5,310	135	415
C21	32,870	366	1,089
C22	134,202	1,713	2,390
C23	97,685	1,110	6,379
C24	85,446	1,060	1,876

TABLE 3-34 (Continued)
FISH HABITAT CAPABILITY ESTIMATES -- NATURAL HABITAT CAPABILITY

Geographic Zone	Pink Salmon	Coho Salmon	Dolly Varden Char
	(Thousands of Smolts)		(Thousands of Fish)
C25	31,800	90	764
S01	73,572	851	1,930
S02	13,882	69	208
S03	103,414	670	2,048
S04	37,965	216	530
S05	21,719	110	435
S06	22,372	191	658
S07	17,792	105	349
S08	20,804	446	1,348
S09	54,996	388	1,796
S10	95,176	463	1,530
S11	12,622	145	327
S12	23,969	1,323	2,764
S13	20,196	104	244
S14	1,665	7	46
K01	2,304	94	308
K02	1,759	126	269
K04	52,406	468	2,297
K05	22,590	209	885
K06	187,208	1,480	4,967
K07	25,941	339	1,366
K08	84,156	446	1,668
K09	8,580	109	437
K10	8,333	53	268
K11	25,183	277	1,005
K12	5,557	104	511
K13	161,898	1,651	6,179
K14	19,302	147	577
K15	2,844	15	80
Total Chatham Area:	1,265,362	8,466	32,899
Total Stikine Area:	520,144	5,088	14,213
Total Ketchikan Area:	608,061	5,518	20,817
Total Tongass N.F.	2,393,567	19,072	67,929

Source: Data analysis using the channel type stream inventories and the fish species habitat capability models.

Table 3-34 shows that habitat capability for all species is greatest on the Chatham Administrative Area, followed by the Ketchikan Area and the Stikine Area. Total Forest-wide smolt habitat capability for pink salmon is 2,393,567 thousand smolt and for coho salmon 19,072 thousand smolt. For Dolly Varden char, the habitat capability is for 67,929 thousand fish. The numbers for Dolly Varden and coho salmon are very sensitive to the assumptions used for rearing potential (production) from lakes. For the calculations in table 3-34, the following assumptions were used:

	Coho	Dolly Varden
% lakes available 0-500 ft. elevation:	30	60
% lakes available 500-1200 ft. elevation:	0	20
Production/acre 0-500 ft. elevation:	75	160
Production/acre 500-1200 ft. elevation:	0	80

An interagency group of biologists reviewed the results of the fish modeling December 7-8, 1989. By looking both at the overall values and the values associated with individual VCUs, it appeared that the production values for coho salmon were reasonable. The Dolly Varden numbers were not scrutinized, since none of the biologists had sufficient knowledge to know the accuracy of the numbers. The biologists found pink salmon numbers to be somewhat questionable, in that the actual harvests in the northern part of the Forest are somewhat lower than in the southern part of the Forest. The habitat capability model predicts the opposite. It appeared, looking at specific geozones, that some of the northern geozones, such as Brabazon (C22) on the eastern part of the Yakutat Forelands, were producing values that were too high.

The model assumes equal production from any given channel type, no matter where it is located on the Forest. Probably some adjustment for north to south and east to west on the Forest would be reasonable. The further north and east, the colder and generally less productive the systems tend to be, while further south and west, the more maritime and more productive the systems should be. These difference may be particularly manifested in the estimates of pink salmon productivity. A further look is being taken to see whether modifications to the habitat capability models should be made.

Effects on Fish Habitat

The previous section described two methods for determining habitat capability: one for pink salmon capability which was based on available spawning area, and one for coho salmon and Dolly Varden char capability which was based on available rearing area. Management activities can be expected to affect habitat capability differently for the spawning and rearing dependent species in the following ways.

Pink salmon capability relies on survival in the spawning gravels during the egg incubation period. A number of studies have shown a relationship between egg survival (egg to smolt) and water quality criteria, including intergravel fine sediments, temperature waterflow, and other factors (reviewed in Reiser and Bjornn 1979). Studies and analyses of Southeast Alaska's pink salmon, including relationships between instream sediment, egg survival and pink salmon returns to streams, have been conducted (Sheridan et al, 1984; Pella and Myren, 1974; Sheridan, 1982). None of these studies have provided a conclusive tie between upland (land not immediately adjacent to streams) management and reduced numbers of returning fish. This may be due to the sensitivity of the biological investigations, or because the overriding limiting factor for fish returning to Southeast Alaska's streams is ocean survival. Ocean survival is influenced by food sources, predators, offshore and nearshore harvests, climate, water temperature and many other factors.

It is not clear how research results on effects of upland management on fish resources in studies outside of Alaska should be resolved with the information available from research studies in Alaska. Studies outside of Alaska show a reduction in fish numbers resulting from certain types of upland management practices. The studies inside Southeast Alaska have not shown a direct tie between upland management and fish numbers. To give an indication of the potential effects of upland management on the fish resources, a cumulative watershed disturbance model is under development. It is described in the water section of this chapter. With increased watershed disturbance from land management activities, an increased risk of change to pink salmon habitat capability could be expected. Figure 3-17 compares the modeled cumulative watershed disturbance during the major period of upland management activities and approximate pink salmon commercial harvests during the same period.

FIGURE 3-17
CUMULATIVE WATERSHED DISTURBANCE AND COMPARISONS TO PINK SALMON HARVESTS

Year x commercial harvest x cumulative disturbance

NOT CURRENTLY AVAILABLE

Figure 3-17 indicated some changes in cumulative disturbance which may result in net decreases to the habitat capability for pink salmon. Increases to the habitat capability for pink salmon have occurred through various enhancement projects, such as fishways, spawning channels and other instream enhancements. Table 3-35 shows pink salmon habitat capability changes resulting from the construction of fishways since 1954, the beginning of large scale timber harvesting in Southeast Alaska.

TABLE 3-35

SMOLT HABITAT CAPABILITY ESTIMATES - ADJUSTED FOR ENHANCEMENT & IMPACTS (mFish)

Geographic Zone	Pink Salmon	Coho Salmon	Dolly Varden Char
	(Thousands of Smolts)		(Thousands of Fish)
C01	12,792	38	307
C02	116,833	352	1,418
C03	5,686	37	300
C04	1,540	8	123
C05	43,783	126	543
C06	106,022	316	1,510
C07	1,623	20	44
C09	41,021	156	967
C10	83,517	403	2,209
C11	10,877	98	746
C12	75,800	333	1,582
C13	27,230	195	1,600
C14	32,218	404	1,223
C15	274,296	932	4,498
C16	1,007	15	78
C17	8,421	387	1,902
C18	42,029	157	789
C20	5,310	135	415
C21	32,870	366	1,089
C22	134,202	1,109	2,390
C23	97,685	1,713	6,379
C24	85,743	1,060	1,876
C25	33,067	90	764
S01	79,812	916	1,912
S02	13,882	69	208
S03	103,414	661	2,024
S04	37,965	215	526
S05	24,965	125	433
S06	22,372	190	656
S07	17,792	104	348
S08	20,804	446	1,346
S09	61,303	383	1,714
S10	110,299	463	1,530
S11	12,622	145	327
S12	23,969	1,323	2,764
S13	20,196	104	244
S14	1,665	7	45
K01	2,350	95	308
K02	1,759	126	269
K04	55,872	477	2,263
K05	22,590	209	885
K06	189,793	1,486	4,900
K07	25,941	339	1,366
K08	85,705	401	1,548
K09	8,580	109	437
K10	8,333	53	268
K11	25,625	279	981

TABLE 3-35 (Continued)
SMOLT HABITAT CAPABILITY ESTIMATES - ADJUSTED FOR ENHANCEMENT & IMPACTS (mFish)

Geographic Zone	Pink Salmon	Coho Salmon	Dolly Varden Char
	(Thousands of Smolts)		(Thousands of Fish)
K12	5,557	104	511
K13	174,911	1,651	6,179
K14	19,657	147	577
K15	2,844	15	80
Total Chatham Area:	1,273,572	8,450	32,752
Total Stikine Area:	551,060	5,151	14,077
Total Ketchikan Area:	629,517	5,491	20,570
Total Tongass N.F.	2,454,149	19,092	67,399

Source: Data analysis using the channel type stream inventories and the fish species habitat capability models.

Comparison of these tables for pink salmon smolt habitat capability shows an increase in capability from 2,393,567 thousand in 1954 to 2,454,149 thousand in 1988, or an increase of approximately three percent. The increases range from one percent on the Chatham Area to six percent on the Stikine Area. Since no negative impacts to pink salmon habitat capability are predicted, only increased access to stream habitat due to construction of fishways is indicated. (Another limitation to the data used to calculate the change in pink smolt habitat capability should be noted: the change in available stream habitat from 1954 to 1988 was determined for coho salmon. On the Chatham Area, most of the fishway construction during the last ten years has been to provide pink salmon access. This habitat was generally already available to coho salmon. Therefore, the estimates for change in stream habitat for pink salmon is an underestimate for the Chatham Area.)

Coho salmon and Dolly Varden char capability is dependent on the availability of appropriate rearing area. Murphy et al. (1986) shows that for both coho and Dolly Varden, winter and summer survival is in large part a function of woody debris and pools (other factors are also used to explain some of the variance). The capability model, developed by an interagency group including the National Marine Fish Service, the Alaska Department of Fish and Game, and the U.S. Fish and Wildlife Service (USDA Forest Service, in preparation as of 12/18/89), assumes that coho and Dolly Varden production is primarily a function of woody debris and pools formed by woody debris. The model also assumes that a key piece, a piece large enough for a given stream to hold all the smaller pieces in place, is necessary. A final assumption is that the input of woody debris in the old-growth situation is equal to the output of old woody debris due to decay, washout and any other loss.

Fish capability is modeled by identifying the number of key pieces of woody debris with no habitat disturbance, adding large woody debris from second growth sources, and subtracting losses of large woody debris due primarily to decay. Each channel type is modeled separately since each is dependent to a different degree on number and size of key pieces of debris. Further detail of the modeling techniques can be found in Appendix B and in USDA Forest Service (1989 -- still in preparation).

Tables 3-36 (coho) and 3-37 (Dolly Varden) show how habitat capability could be expected to change over time, following clearcut harvest to the streambank in the different channel types. {Clearcut harvest to the streambank is modeled to establish a benchmark, or the amount of change in fish habitat capability that would occur with maximum timber removal. Clearcut harvest to the streambank of all streams is not considered to meet the intent of the National Forest Management Act's regulations on riparian areas (36 CFR 219.27 (e))}. The model assumes that woody debris within the stream is left in place during clearcut harvest. The changes in capability are calculated for each channel type over a period of 21 decades. Coefficients for every third decade (30 year period) following harvest are shown in numbers (smolts for coho; fish for Dolly Varden) per foot of channel length. This same information is shown in graphical form for selected channel types in Figures 3-18 (coho) and 3-19 (Dolly Varden).

From these figures it is evident that habitat capability differs significantly by channel type, and that streamside harvest results in dissimilar longterm effects on habitat capability. For instance, in figure 3-18 which shows the effects of clearcut harvest to the stream edge on coho capability, the capability of channel types L1 (Placid/Glide process group) and C1 (Low Gradient Floodplain process group) are similar in old growth (shown as zero years following harvest). However, since the rearing capability for C1 streams is dependent on very large woody debris (key piece size greater than 36 inches in diameter), and the rearing capability for L1 channels is not dependent on large woody debris, following clearcut harvest there is a large reduction in capability for C1 channels and no reduction in L1 channels, over time.

Comparison of Figures 3-18 (coho) and 3-19 (Dolly Varden) show that streams with high coho capability are not necessarily the same streams with high Dolly Varden capability. For instance, comparing C2 (Large Low Gradient, Contained process group) and L1 channel types, shows that for Dolly Varden, C2 is the preferred channel type, while for coho salmon, L1 is the preferred channel type.

The figures indicate that the maximum capability reduction following clearcut harvest would occur approximately 90 to 130 years following harvest. This corresponds to the period in which the input of second growth large woody debris to a stream system becomes greater than the decay of large woody debris existing in the stream prior to harvest. The shape of the curves during the decay phase, prior to input of second growth, is an exponential decay of wood, while the rate of woody debris replacement (the regrowth phase) is based on the rate that large trees grow along different channel types. The growth rate of large woody debris is based on yield tables by Taylor (1934), which does not predict growth past 150 years. Numbers of large woody debris stems beyond 150 years were based on best estimates, including interpolation of Taylor's numbers. The regrowth phase of the channel productivity is dependent on the assumptions about second growth.

TABLE 3-36
CAPABILITY CHANGE FOR COHO SALMON AFTER CLEARCUT HARVEST (smolt/foot)

	Decade after clearcut harvest							
Channel type	0	3	6	9	12	15	18	21
A1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A2	0.0050	0.0041	0.0036	0.0034	0.0034	0.0036	0.0036	0.0036
A3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A5	0.0050	0.0047	0.0045	0.0044	0.0044	0.0045	0.0045	0.0045
A6	0.0050	0.0048	0.0047	0.0046	0.0046	0.0047	0.0047	0.0047
A7	0.0050	0.0034	0.0026	0.0022	0.0023	0.0025	0.0026	0.0026
B1	0.1900	0.1095	0.0691	0.0489	0.0552	0.0763	0.0833	0.0862
B2	0.0400	0.0310	0.0260	0.0233	0.0236	0.0256	0.0262	0.0264
B3	0.1000	0.0711	0.0553	0.0466	0.0475	0.0539	0.0558	0.0564
B4	0.0250	0.0221	0.0205	0.0196	0.0197	0.0203	0.0205	0.0206
B5	0.0200	0.0132	0.0095	0.0081	0.0085	0.0094	0.0098	0.0099
B6	0.0500	0.0464	0.0444	0.0433	0.0427	0.0424	0.0428	0.0436
B7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
B8	0.1500	0.0902	0.0602	0.0451	0.0499	0.0655	0.0708	0.0729
C1	0.4500	0.2481	0.1469	0.0961	0.0706	0.1044	0.1446	0.1647
C2	0.2000	0.1822	0.1743	0.1708	0.1731	0.1785	0.1804	0.1812
C3	0.2900	0.1715	0.1120	0.0822	0.0673	0.0871	0.1107	0.1225
C4	0.1900	0.1237	0.0905	0.0801	0.0874	0.0989	0.1038	0.1059
C5	0.1900	0.1689	0.1595	0.1577	0.1617	0.1667	0.1690	0.1700
C6	0.3300	0.2149	0.1571	0.1281	0.1372	0.1673	0.1775	0.1815
Ds	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Es	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L1	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200
L2	0.5100	0.4598	0.4226	0.3950	0.3832	0.3817	0.3755	0.3694
L3	4.8300	4.8300	4.8300	4.8300	4.8300	4.8300	4.8300	4.8300
L4	0.9600	0.7609	0.6135	0.5042	0.4575	0.4515	0.4270	0.4027
L5	1.6000	1.3927	1.2390	1.1417	1.0984	1.0770	1.0492	1.0231

Source: Habitat capability model documented in appendix B and in USDA Forest Service, in preparation. Coefficients are calculated for every decade, though reported in this table for every third decade.

TABLE 3-37

CAPABILITY CHANGE FOR DOLLY VARDEN CHAR AFTER CLEARCUT HARVEST (fish/foot)

	Decade after clearcut harvest							
Channel type	0	3	6	9	12	15	18	21
A1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A2	0.3100	0.2527	0.2212	0.2091	0.2127	0.2205	0.2235	0.2246
A3	0.0900	0.0624	0.0472	0.0389	0.0398	0.0459	0.0477	0.0483
A4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A5	0.3300	0.3077	0.2954	0.2887	0.2894	0.2943	0.2958	0.2963
A6	0.1400	0.1337	0.1302	0.1283	0.1290	0.1310	0.1317	0.1319
A7	0.1600	0.1095	0.0817	0.0711	0.0742	0.0811	0.0838	0.0847
B1	0.3500	0.2017	0.1273	0.0900	0.1017	0.1405	0.1535	0.1588
B2	0.0900	0.0697	0.0586	0.0524	0.0531	0.0576	0.0589	0.0593
B3	0.8300	0.5903	0.4588	0.3866	0.3942	0.4472	0.4628	0.4681
B4	0.1000	0.0883	0.0818	0.0783	0.0787	0.0813	0.0820	0.0823
B5	0.1400	0.0926	0.0666	0.0567	0.0596	0.0661	0.0686	0.0694
B6	0.1900	0.1763	0.1688	0.1646	0.1624	0.1611	0.1626	0.1655
B7	0.3300	0.2943	0.2747	0.2671	0.2694	0.2742	0.2761	0.2768
B8	0.3800	0.2285	0.1525	0.1144	0.1263	0.1659	0.1792	0.1846
C1	0.6100	0.3364	0.1991	0.1303	0.0957	0.1416	0.1960	0.2232
C2	0.6400	0.5832	0.5579	0.5466	0.5539	0.5711	0.5773	0.5799
C3	0.7300	0.4316	0.2820	0.2069	0.1693	0.2192	0.2786	0.3083
C4	0.3300	0.2149	0.1571	0.1390	0.1518	0.1717	0.1803	0.1839
C5	0.3800	0.3378	0.3190	0.3154	0.3234	0.3335	0.3380	0.3400
C6	0.2900	0.1888	0.1381	0.1126	0.1206	0.1471	0.1559	0.1595
D1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D3	0.2800	0.2102	0.1752	0.1643	0.1720	0.1841	0.1893	0.1915
D4	0.4100	0.3078	0.2566	0.2309	0.2389	0.2656	0.2746	0.2782
D5	0.4300	0.3443	0.3013	0.2797	0.2865	0.3089	0.3164	0.3194
D6	0.0300	0.0232	0.0195	0.0175	0.0164	0.0157	0.0165	0.0179
D7	0.0400	0.0310	0.0260	0.0233	0.0218	0.0210	0.0205	0.0203
Es	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L1	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100
L2	1.3100	1.1810	1.0854	1.0146	0.9843	0.9804	0.9645	0.9488
L3	6.1600	6.1600	6.1600	6.1600	6.1600	6.1600	6.1600	6.1600
L4	0.5300	0.4201	0.3387	0.2784	0.2526	0.2493	0.2358	0.2223
L5	2.8700	2.4981	2.2225	2.0479	1.9702	1.9318	1.8819	1.8352

Source: Habitat capability model documented in appendix B and in USDA Forest Service, in preparation. Coefficients are calculated for every decade, though reported in this table for every third decade.

FIGURE 3-18
EFFECTS ON COHO CAPABILITY

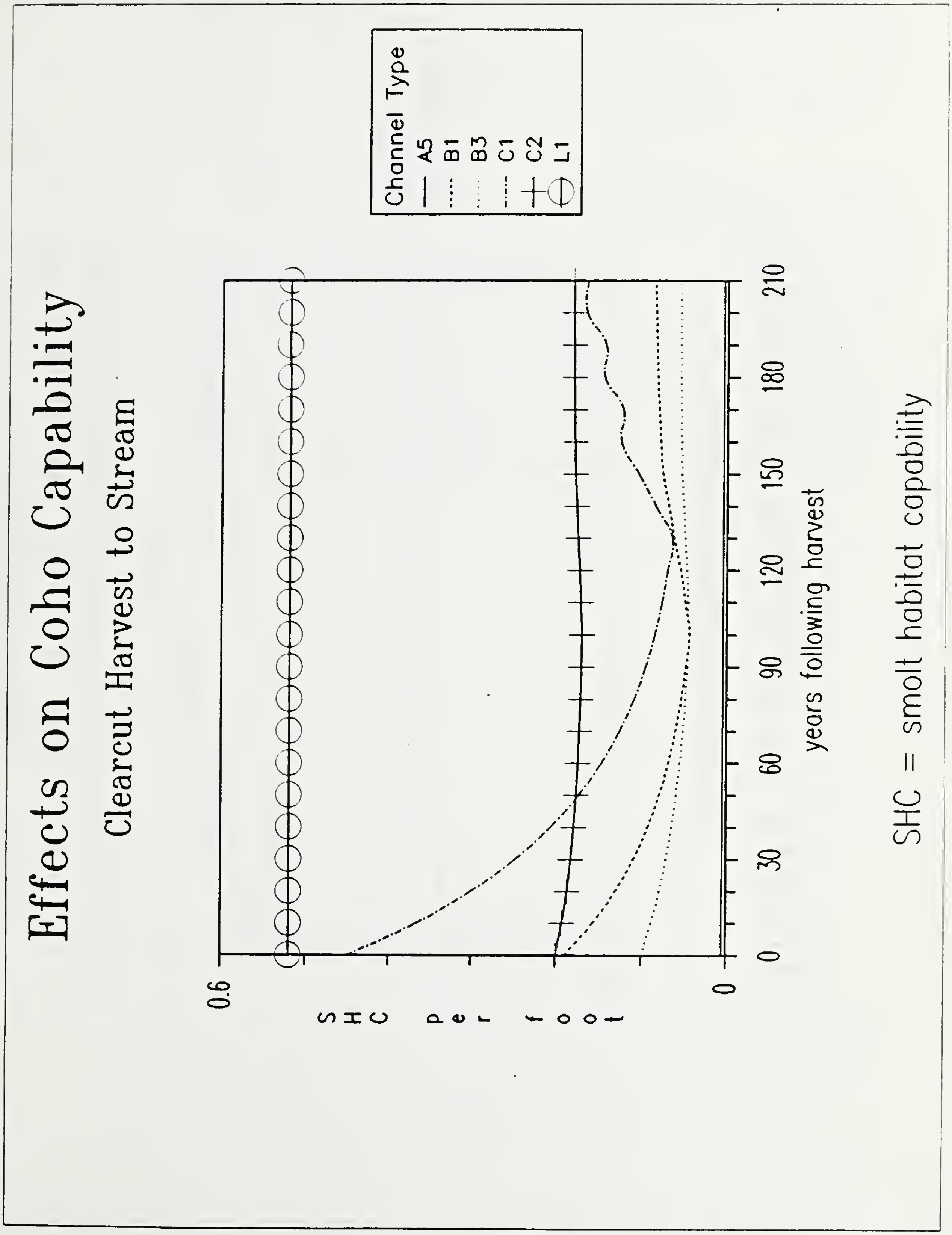
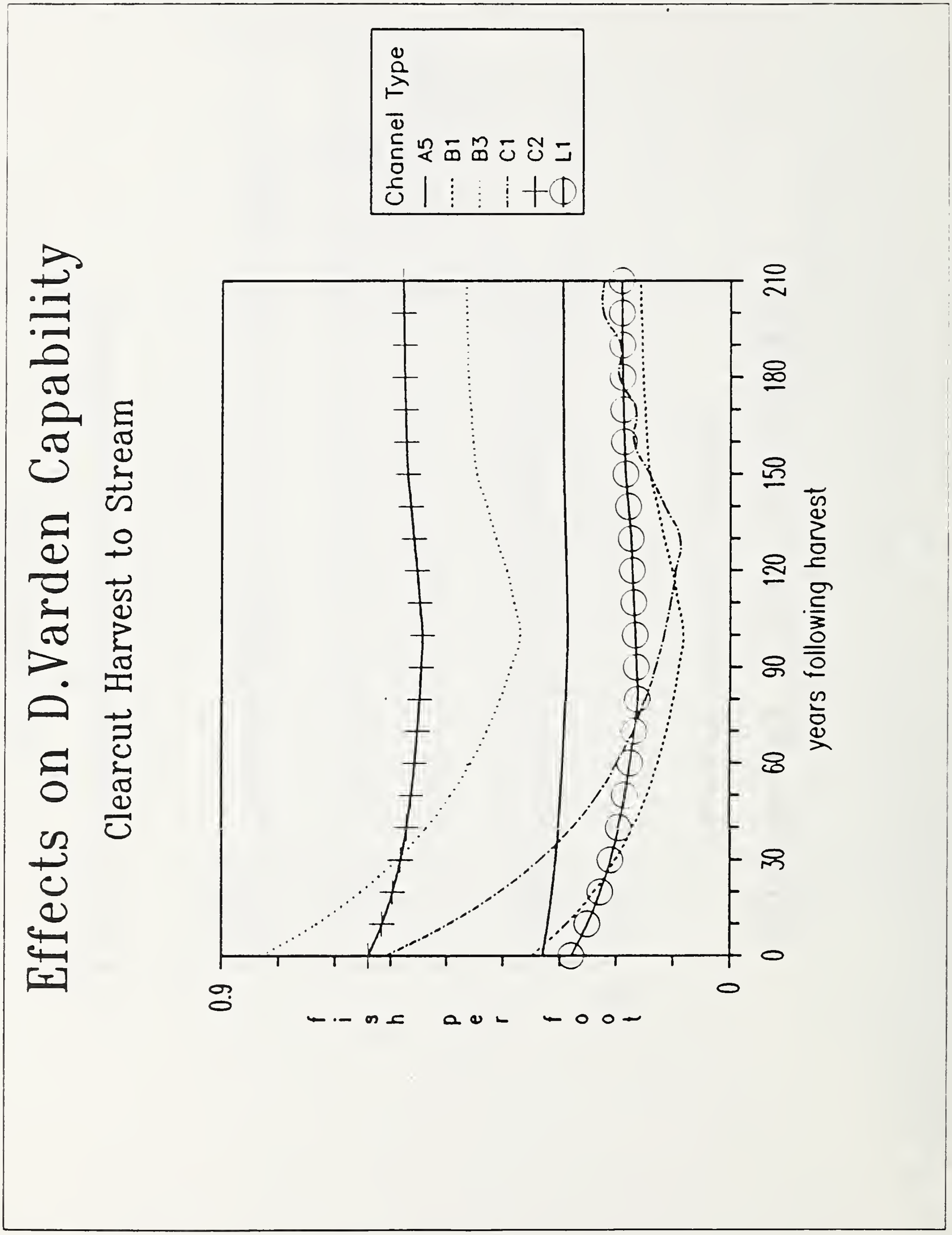


FIGURE 3-19
EFFECTS ON DOLLY VARDEN CAPABILITY



Buffer strips along streams can be designed in a number of different ways depending on the management objective. Some buffer strips result in little or no reduction in fish habitat capability, while others may result in a capability loss. In large part, change in habitat capability depends on the management prescription that has been applied. For instance, if a 100 foot no harvest buffer strip were prescribed, it is unlikely that any reduction in woody debris sources would occur since 100 percent of the woody debris originates from within 100 feet of the stream bank (Murphy et al. 1987). However if a 30 foot buffer strip were prescribed, then a reduction in woody debris sources would occur. There would likely be a reduction in the habitat capability for those species requiring woody debris for pool habitat.

The current goal for fish habitat on the Tongass National Forest is displayed in the Tongass Land Management Plan (TLMP) (USDA Forest Service 1979). TLMP states that "the goal is to preserve the biological productivity of every fish stream on the Tongass" (USDA Forest Service 1979, p. 92). During the early years of TLMP implementation, there was often timber harvest to the streambank, or, if buffer strips were used, they were not always sufficient to maintain long-term woody debris sources to streams. In recent years, with additional information on the habitat requirements of fish, stream buffers have been left which maintain long-term sources of woody debris. On the average, over the last ten years of TLMP implementation, there has been some reduction in woody debris sources in the buffer strips due to timber harvest. Using the coho salmon and Dolly Varden char models, this reduction has been estimated (Tables 3-38 and 3-39) by channel type. Sample channel types are graphed in Figures 3-20 (coho), 3-21 (Dolly Varden - Class 1 streams), and 3-22 (Dolly Varden - Class 2 streams).

TABLE 3-38
CAPABILITY CHANGES FOR COHO SALMON AFTER BUFFERED HARVEST (smolt/foot) 1/

Channel type	Decade after clearcut harvest 0	3	6	9	12	15	18	21
A1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A2	0.0050	0.0041	0.0036	0.0034	0.0034	0.0036	0.0036	0.0036
A3	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A5	0.0050	0.0047	0.0045	0.0044	0.0044	0.0045	0.0045	0.0045
A6	0.0050	0.0048	0.0047	0.0046	0.0046	0.0047	0.0047	0.0047
A7	0.0050	0.0034	0.0026	0.0022	0.0023	0.0025	0.0026	0.0026
B1	0.1900	0.1876	0.1864	0.1858	0.1860	0.1866	0.1868	0.1869
B2	0.0400	0.0358	0.0336	0.0323	0.0325	0.0334	0.0336	0.0337
B3	0.1000	0.0945	0.0915	0.0899	0.0900	0.0912	0.0916	0.0917
B4	0.0250	0.0227	0.0214	0.0207	0.0207	0.0213	0.0214	0.0215
B5	0.0200	0.0191	0.0186	0.0185	0.0185	0.0186	0.0187	0.0187
B6	0.0500	0.0471	0.0455	0.0447	0.0442	0.0439	0.0438	0.0437
B7	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
B8	0.1500	0.1482	0.1473	0.1469	0.1470	0.1475	0.1476	0.1477
C1	0.4500	0.4500	0.4500	0.4500	0.4500	0.4500	0.4500	0.4500
C2	0.2000	0.1929	0.1897	0.1883	0.1892	0.1914	0.1922	0.1925
C3	0.2900	0.2900	0.2900	0.2900	0.2900	0.2900	0.2900	0.2900
C4	0.1900	0.1900	0.1900	0.1900	0.1900	0.1900	0.1900	0.1900
C5	0.1900	0.1816	0.1778	0.1770	0.1783	0.1801	0.1809	0.1813
C6	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300
Ds	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Es	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L1	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200	0.5200
L2	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100	0.5100
L3	4.8300	4.8300	4.8300	4.8300	4.8300	4.8300	4.8300	4.8300
L4	0.9600	0.9401	0.9253	0.9144	0.9097	0.9092	0.9067	0.9043
L5	1.6000	1.5793	1.5639	1.5542	1.5498	1.5477	1.5449	1.5423

Source: Habitat capability model documented in appendix B and in USDA Forest Service, in preparation. Coefficients are calculated for every decade, though reported in this table for every third decade.

1/ Coefficients result from implementing prescription #13-G from the Forest Plan Revision's proposed Forest-wide Direction & Standards and Guidelines & Management Area Prescriptions (USDA Forest Service. 1989 -- Draft G). This prescription is considered an average treatment applied to riparian areas since the implementation of the Tongass Land Management Plan in 1979. Some riparian areas have been treated with no harvest; some have had buffers; and others have had clearcut to the stream edge.

TABLE 3-39
CAPABILITY CHANGES FOR DOLLY VARDEN CHAR AFTER BUFFERED HARVEST (fish/ft)1/

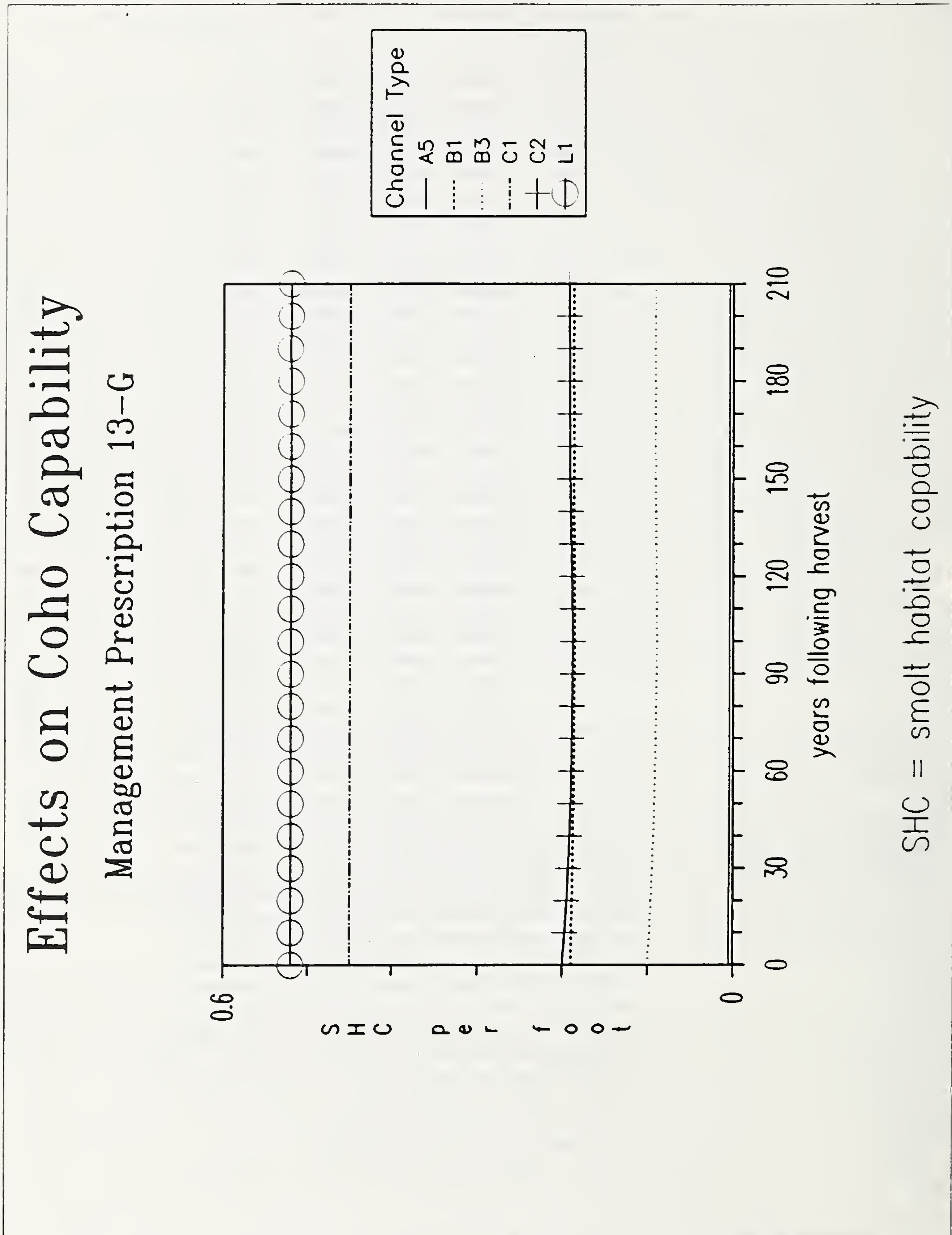
	Decade after clearcut harvest							
Channel type	0	3	6	9	12	15	18	21
A1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A2	0.3100	0.2527	0.2212	0.2091	0.2127	0.2205	0.2235	0.2246
A3	0.0900	0.0864	0.0844	0.0834	0.0835	0.0843	0.0845	0.0846
A4	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
A5	0.3300	0.3077	0.2954	0.2887	0.2894	0.2943	0.2958	0.2963
A6	0.1400	0.1337	0.1302	0.1283	0.1290	0.1310	0.1317	0.1319
A7	0.1600	0.1095	0.0817	0.0711	0.0742	0.0811	0.0838	0.0847
B1	0.3500	0.3456	0.3433	0.3422	0.3426	0.3437	0.3441	0.3443
B2	0.0900	0.0807	0.0755	0.0727	0.0730	0.0751	0.0757	0.0759
B3	0.8300	0.7845	0.7595	0.7458	0.7472	0.7573	0.7602	0.7612
B4	0.1000	0.0906	0.0855	0.0826	0.0829	0.0850	0.0856	0.0858
B5	0.1400	0.1338	0.1305	0.1292	0.1295	0.1304	0.1307	0.1308
B6	0.1900	0.1790	0.1730	0.1697	0.1679	0.1669	0.1663	0.1660
B7	0.3300	0.2943	0.2747	0.2671	0.2694	0.2742	0.2761	0.2768
B8	0.3800	0.3755	0.3732	0.3720	0.3724	0.3736	0.3740	0.3741
C1	0.6100	0.6100	0.6100	0.6100	0.6100	0.6100	0.6100	0.6100
C2	0.6400	0.6173	0.6071	0.6026	0.6056	0.6125	0.6149	0.6160
C3	0.7300	0.7300	0.7300	0.7300	0.7300	0.7300	0.7300	0.7300
C4	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300	0.3300
C5	0.3800	0.3631	0.3556	0.3540	0.3567	0.3602	0.3618	0.3625
C6	0.2900	0.2900	0.2900	0.2900	0.2900	0.2900	0.2900	0.2900
D1	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D2	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
D3	0.2800	0.2667	0.2601	0.2580	0.2595	0.2618	0.2628	0.2632
D4	0.4100	0.4100	0.4100	0.4100	0.4100	0.4100	0.4100	0.4100
D5	0.4300	0.4300	0.4300	0.4300	0.4300	0.4300	0.4300	0.4300
D6	0.0300	0.0291	0.0286	0.0284	0.0282	0.0281	0.0281	0.0281
D7	0.0400	0.0310	0.0260	0.0233	0.0218	0.0210	0.0205	0.0203
Es	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
L1	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100	0.7100
L2	1.3100	1.3100	1.3100	1.3100	1.3100	1.3100	1.3100	1.3100
L3	6.1600	6.1600	6.1600	6.1600	6.1600	6.1600	6.1600	6.1600
L4	0.5300	0.5190	0.5109	0.5048	0.5023	0.5019	0.5006	0.4992
L5	2.8700	2.8328	2.8053	2.7878	2.7800	2.7762	2.7712	2.7665

Source: Habitat capability model documented in appendix B and in USDA Forest Service, in preparation. Coefficients are calculated for every decade, though reported in this table for every third decade.

1/ Coefficients listed are for class 1 streams only. Class 2 streams have different coefficients because their streamsides are differently managed. Coefficients result from implementing prescription #13-G from the Forest Plan Revision's proposed Forest-wide Direction & Standards and Guidelines & Management Area Prescriptions (USDA Forest Service, 1989 -- Draft G). Coefficients for class 2 streams are available in the model documentation (USDA Forest Service -- in preparation). This prescription is considered an average treatment applied to riparian areas since the implementation of the Tongass Land Management Plan in 1979. Some riparian areas have been treated with no harvest; some have had buffers; and others have had clearcut to the stream edge.

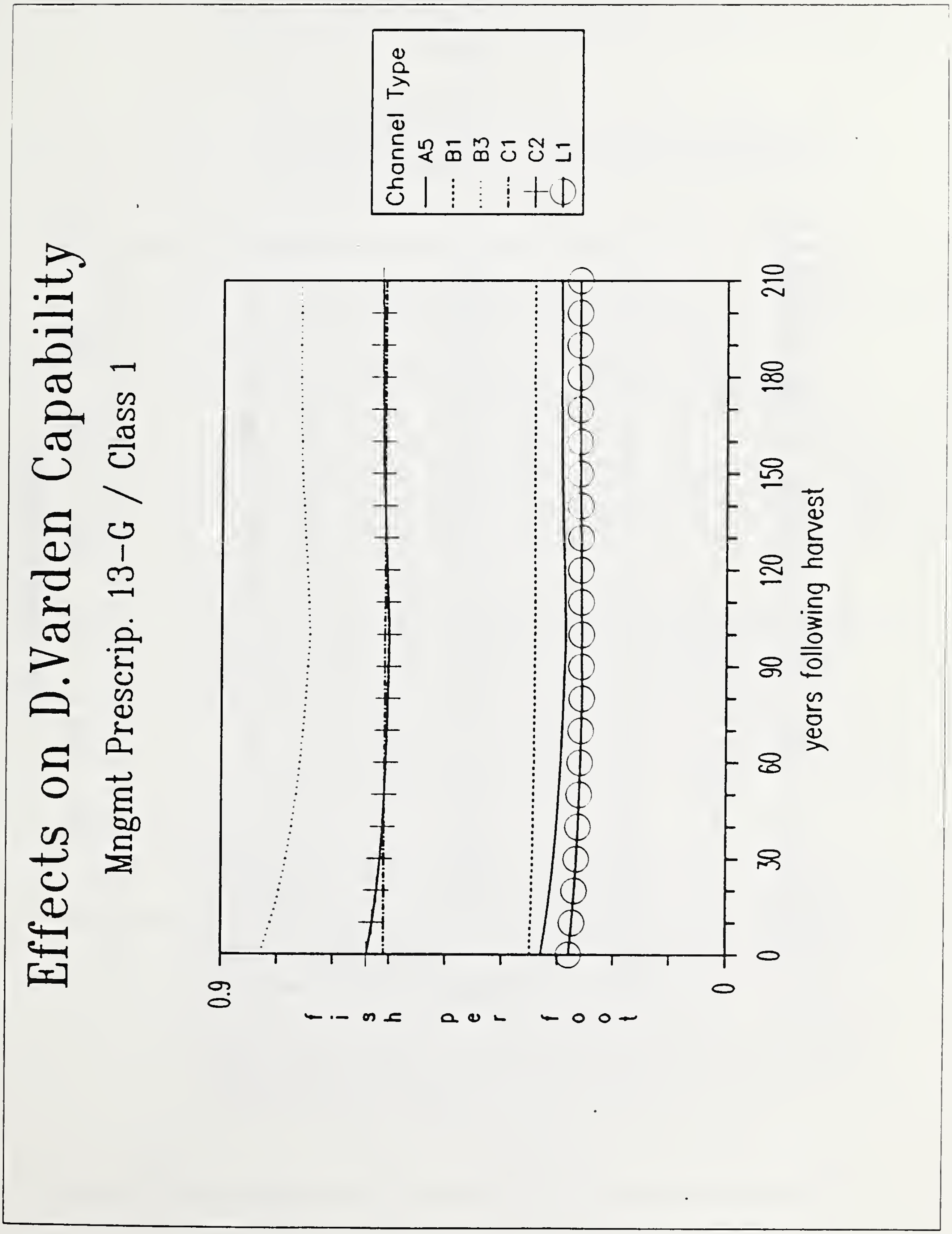
FIGURES 3-20

ESTIMATION OF EFFECTS ON DOLLY VARDEN & COHO WITH PRESCRIPTION 13-G 1/



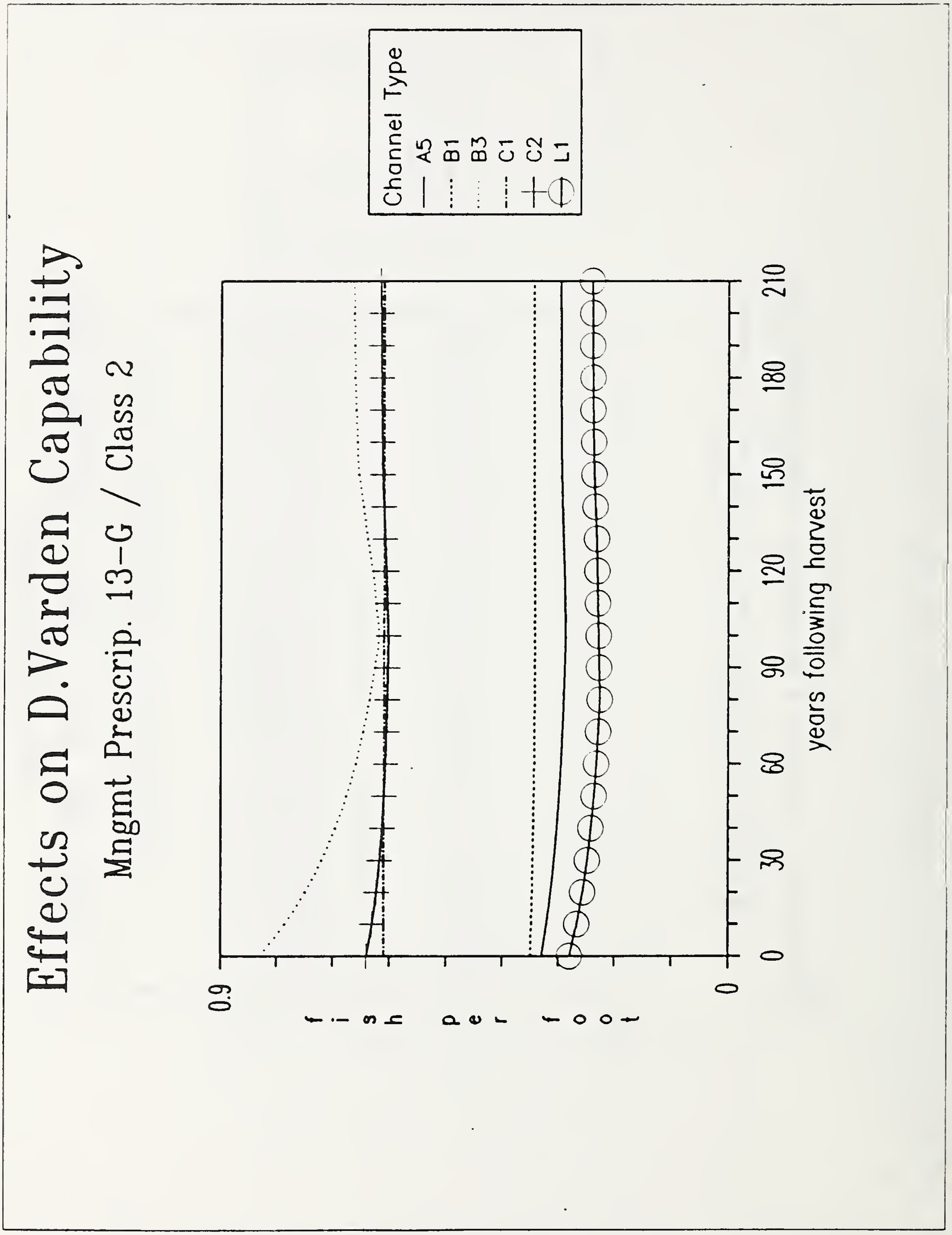
FIGURES 3-21

ESTIMATION OF EFFECTS ON DOLLY VARDEN & COHO WITH PRESCRIPTION 13-G 1/



FIGURES 3-22

ESTIMATION OF EFFECTS ON DOLLY VARDEN & COHO WITH PRESCRIPTION 13-G 1/



Using the habitat capability coefficients by channel type (Tables 3-36 to 3-39), and applying these to the Forest's channel network, estimates of habitat capability changes resulting in today's conditions can be made. In order to estimate today's capability the following four pieces of information are used: length of each channel type, capability by channel type, amount of each channel type available (i.e. without downstream barriers to anadromous fish), and vegetation condition of the riparian area. The source of each of the data items is as follows:

- channel type lengths: Tongass-wide channel typing inventory. For wilderness areas without channel typing inventories, proration estimates from areas with channel typing data are made.

- capability by channel type: The models described on the preceding pages.

- amount of channel type available: Biologists on each of the Tongass Administrative Areas made estimates of amount of stream class I habitat available to coho salmon in 1954, 1979 and 1988.

- vegetative condition: Estimates were made of riparian vegetative condition using the Geographical Information System (GIS). Operationally, 100 foot buffers (150 foot buffers for some of the larger floodplain channels) were computer generated along every stream in the channel type database. The area encompassed by these buffers was overlain with the timber type maps stored in the GIS. A report was produced showing, by VCU, the acres of the buffers in each timber size class. The following interpretations of size class in the timber type data were used:

  Recently logged = average 5 year old stands
  Size Class 1 = average 15 year old stands (seedlings/sapplings)
  Size Class 2 = average 45 year old stands (pole timber)
  Size Class 3 & 4 = considered to be old growth for the model

  In some cases, riparian areas that have never been harvested were inventoried as size class logged, 1 or 2; this occurs in areas with early successional vegetation, such as in Yakutat and on mainland glaciated areas. These locations were reinterpreted to be old-growth in the capability determinations.

Effects of past management activities were modeled by assuming: 1) all riparian timber harvest prior to 1979 generally employed a clearcut prescription; and, 2) all riparian harvest between 1979 and 1988 averaged a Prescription 13-G harvest, as used in the Forest Plan Revision's proposed Forest-wide Direction & Standards and Guidelines & Management Area Prescriptions (USDA Forest Service. 1989 -- Draft G) {This prescription is considered an average treatment applied to riparian areas since the implementation of the Tongass Land Management Plan in 1979. Some riparian areas have been treated with no harvest; some have had buffers; and others have had clearcut to the stream edge.} Therefore, any riparian buffer currently in Size Class 1 and 2 used the clearcut habitat capability tables, and those in the "Logged" size class used the Prescription 13-G habitat capability tables.

Previous tables showed the estimated habitat capability prior to the onset of large scale industrial logging (1954) on the Tongass National Forest for coho salmon and Dolly Varden char, the changes that have resulted since 1954, and changes resulting due to timber harvest related impacts, and due to habitat enhancement from fishway construction. The influence of impacts and enhancement on fish habitat capability can be segregated. A summary of the information from these tables, as well as the specific effects of enhancement and impacts, is located in Table 3-40.

TABLE 3-40

SUMMARY OF FISH HABITAT CAPABILITY CHANGES FOR COHO & DOLLY VARDEN 1954-1988 (in MFish) 1/

Species	Statistic	Chatham (thousands of fish)	Stikine	Ketchikan	Forest-wide
Coho	1954 Capability:	8,466	5,088	5,518	19,072
Coho	1988 Capability with no enhancement:	8,432	5,063	5,441	18,936
	percent of 1954 capability:	99.6%	99.5%	98.6%	99.3%
Coho	1988 Capability with enhancement:	8,450	5,151	5,491	19,092
	percent of 1954 capability:	99.8%	101.2%	99.5%	100.1%

Dolly Varden	1954 Capability:	32,899	14,213	20,817	67,929
Dolly Varden	1988 Capability:	32,752	14,077	20,570	67,399
	percent of 1954 capability:	99.6%	99.0%	98.8%	99.2%

Source: Habitat capability models (see Appendix B and planning records).

1/ These numbers represent estimates in the change in capability of production of coho salmon and Dolly Varden char between 1954 and 1988, in thousands of fish for Dolly Varden and thousands of smolt for coho. They assume that enhancement has occurred only as a result of fishway construction, although there have been other types of enhancement. There is no enhancement calculation for Dolly Varden because all habitat is used by Dolly Varden, both before and after fishway construction.

Table 3-40 shows that current coho salmon capability is estimated to be 100.1 percent of 1954's capability. Without the construction of fish ladders to access additional stream habitat, the current capability would be 99.3 percent of 1954's capability. The largest percentage of coho fish passage enhancement has occurred on the Ketchikan Area (.9 percent) followed by the Stikine (.7 percent) and Chatham Areas (.2 percent).

Table 3-40 also shows estimates of capability changes for Dolly Varden char. The table indicates that Forest-wide Dolly Varden capability is at 99.2 percent of the 1954 value. The greatest magnitude of change has occurred on the Ketchikan Area, followed by the Stikine Area and the Chatham Area. These relationships appear to be related to the extensive timber harvest on Prince of Wales Island between 1954 and 1979, and the vast acreages of unharvested areas on the Chatham Area.

The model and results described represent one facet of the effects of land management activities on fish habitat capability. Other factors resulting from land management activities may also affect habitat capability. For instance, timber harvest is suspected of raising stream temperatures with resulting fish kills of adult fish. Data has been compiled by the Alaska Cooperative Forestry/Fisheries Working Group (Gibbons 1989) on all known instances of fish kills in Southeast Alaska. The data indicates that fish kills have occurred in both logged and unlogged areas. Further identification of the relationships between fish kills, factors causing these fish kills (i.e. environmental conditions such as temperature, long periods of reduced rainfall, numbers of returning salmon, dissolved oxygen content, tidal flow and watershed characteristics), and the relationship to timber harvest practices is under review by the Alaska Cooperative Forestry/Fisheries Working Group.

Effects on Estuaries

A number of activities on National Forest System lands indirectly affect estuarine systems and their productivity. The primary activities include log transfer sites and storage sites. These activities require State Tidelands permits and U.S. Army Corps of Engineers permits and the activities must be compatible with coastal zone management policies. For further information on log storage and transfer and their affects, see the Transportation section of this document. [References: Sedell and Duval (1985), Robinson-Wilson and Jackson (undated, approximately 1986), and Faris and Vaughan (1985).]

DEMAND

Hundreds of comments were received concerning fish habitat and commercial, sport and subsistence fisheries during the public scoping completed for the Revision of the Tongass Land and Resource Management Plan. The majority of these comments advocated maintenance of the current habitat values on the Forest, or improvement upon those values. These comments reflect the demand for fish from the Tongass National Forest.

Demand for fish production is for three primary purposes of use: subsistence, commercial and sport. Demand for subsistence fish is covered in the subsistence portion of this AMS, while commercial and sport fish demand are reviewed in this section. The commercial fish demand is based on goals set by Regional Salmon Planning Teams. Sport fish demand is estimated by projecting past use trends into the future.

SUBSISTENCE

See section in Chapter 3 on subsistence, and current subsistence fishing with permits as described in the sections above.

COMMERCIAL FISH

Demand for commercial fish is difficult to quantify since it depends on numerous factors, including price, international markets, and numbers of participants in the fisheries. However, in order to quantify reasonable production goals, Regional Salmon Planning Teams set targets for fish production for the year 2000. The salmon production goals can be used as an indication of the demand for commercial fish on the Tongass. They represent what is thought to be a realistic and attainable goal in the rehabilitation of Southeast Alaska's salmon harvests to previous levels.

The difference between the salmon production goals for future harvests and current harvests are referred to as the GAP (Table 3-39a and 3-39b). The GAP is calculated for all five species of commercially harvested salmon, not just the species that are used as Management Indicator Species in the Revision.

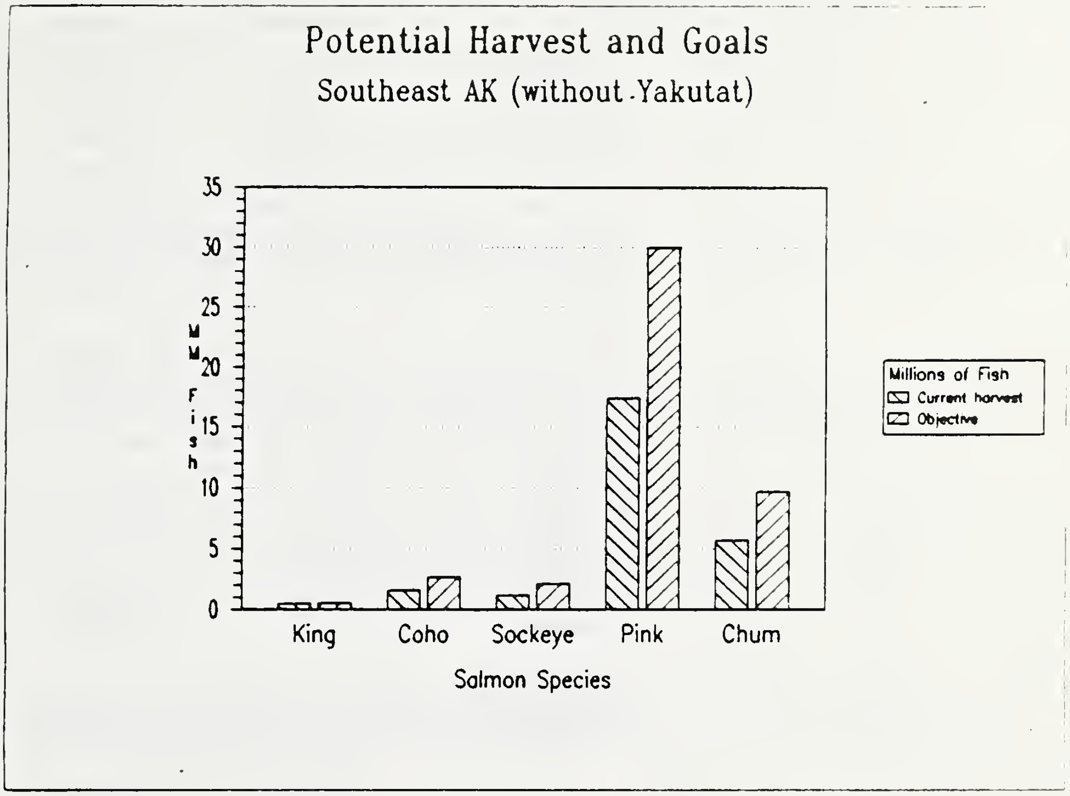
The Regional Comprehensive Salmon Plan for Southeast Alaska, excluding Yakutat, defines GAP as the difference between the Present Potential Harvest (the harvest possible when all current management strategies are at their full capacity of salmon production) and the Planned Harvest Objective (the harvest level needed to return runs of salmon to levels recorded at the turn of the century). The GAP and harvest goals, are for all of Southeast Alaska (excluding Yakutat), and represent contributions from all sources including the National Forest (Table 3-41 and Figure 3-23). (Note: National Forest habitats are estimated to contribute approximately 80 percent of the fisheries in Southeast Alaska.) Except for king salmon, the present potential harvest is approximately half of the planned harvest objective. Current king salmon harvest is approximately 10 percent less than the planned harvest objective.

TABLE 3-41
GAP TOTALS UPDATED TO 1987 FOR NORTHERN AND SOUTHERN SOUTHEAST (Number of Fish)1/

	Present Potential Harvest2/	Planned Harvest Objective	GAP	Percent3/
King Salmon	493,330	537,000	43,670	92
Coho Salmon	1,549,241	2,650,000	1,100,759	58
Sockeye Salmon	1,165,800	2,100,000	934,200	56
Pink Salmon	17,358,749	30,000,000	12,641,251	58
Chum Salmon	5,682,450	9,700,000	4,017,550	59

Source: Northern Southeast Regional Planning Team, 1987. 1987 Update and 5-Year Action Plan for Salmon Enhancement of the Northern Southeast Alaska Comprehensive Salmon Plan (Phase II). p 54.
1/GAP equals the planned harvest objective minus the present potential harvest for Southeast Alaska (excluding Yakutat).
2/ This column represents the current potential harvest if all habitat, improvement projects, and aquaculture facilities were producing fish to their maximum capability. Current harvests generally are not equal to the present potential harvest.
3/ The present potential harvest, as a percentage of the planned harvest objective.

FIGURE 3-23
CURRENT POTENTIAL HARVEST AND YEAR 2000 GOALS FOR SOUTHEAST ALASKA W/OUT YAKUTAT



Sources and notes: see Table 3-41.

Table 3-42, and the accompanying graph in Figure 3-24, depict the GAP for Yakutat, located in the northern portion of the Tongass National Forest. The salmon planning process for Yakutat is separate from the remainder of Southeast Alaska. (Note: The area included in the Yakutat Comprehensive Salmon Plan, and represented by this graph and figure, includes the coastal areas from Cape Fairweather to Cape Suckling along the north coast of the Gulf of Alaska. National Forest Lands make up less than one-third of this geographical area; however, the majority of the fish production results from habitats located on National Forest system lands. Alaska Department of Fish and Game 1984.) The table and figure show that present harvest is far short of the goal for the year 2000 for king and pink salmon. Harvest for coho salmon is close to the year 2000 goal, while harvest for chum salmon far exceeds the year 2000 goal. Harvest for sockeye salmon is at 79 percent of the year 2000 goal.

The current Yakutat harvest for pink salmon, and its large production gap, may be somewhat misleading. Available pink salmon often exceed the demand for pink salmon in Yakutat due to large transportation costs which often make pink salmon unprofitable to harvest.

TABLE 3-42

GAP TOTALS UPDATED TO 1988 FOR YAKUTAT (Number of Fish)1/

	Present Harvest2/	Year 2000 Goals	GAP	Percent3/
King Salmon	1,333	7,000	5,667	19
Coho Salmon	160,802	175,000	14,198	92
Sockeye Salmon	177,818	225,000	47,182	79
Pink Salmon	35,331	150,000	114,669	24
Chum Salmon	21,085	13,000	-8,085	162

Source: Yakutat Comprehensive Salmon Plan (Alaska Department of Fish and Game 1984); Alaska Department of Fish and Game 1989, personal communication with Gary Gunstrom 12/89. FAXed copy received from the 1988 report to the Board of Fisheries.

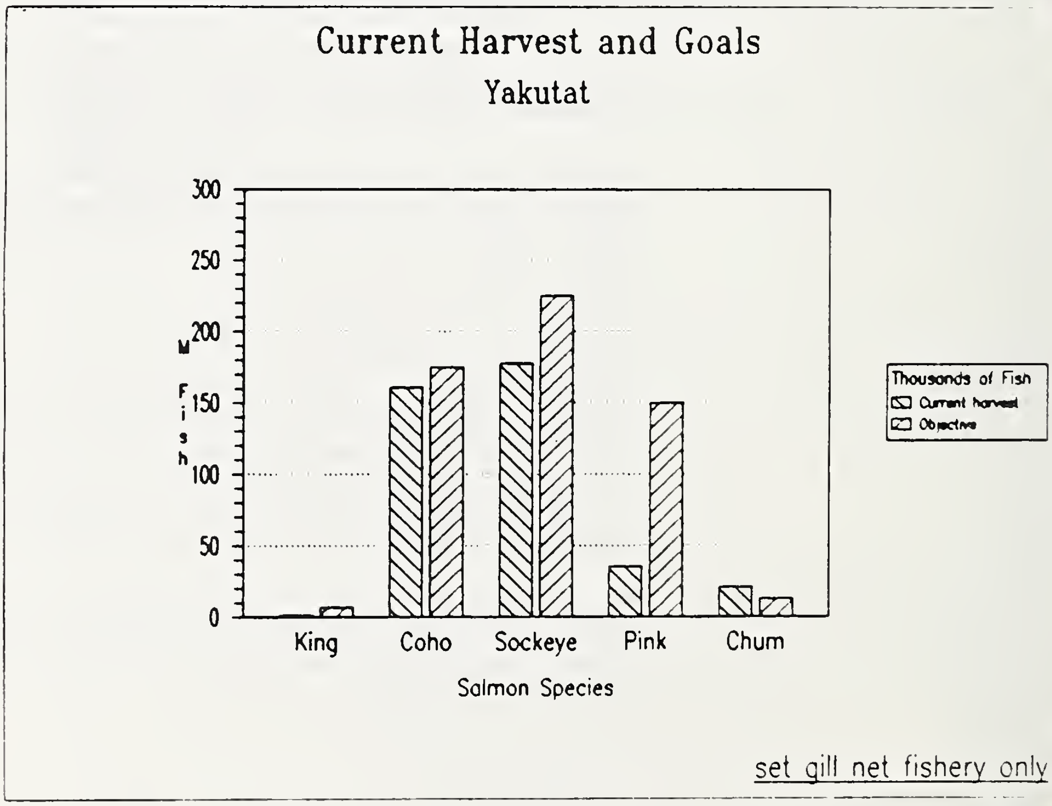
1/ GAP equals the planned harvest objective minus the present harvest for Yakutat. Includes the coastal areas from Cape Fairweather to Cape Suckling along the north coast of the Gulf of Alaska. National Forest Lands make up less than one-third of this geographical area; however, the majority of the fish production results from habitats located on National Forest system lands.

2/ Present harvest represents the average of the set gill net fishery from 1984 to 1988. Power troll was not included in the Year 2000 goal calculations in the Yakutat Comprehensive Salmon Plan.

3/ The present potential harvest, as a percentage of the planned harvest objective.

FIGURE 3-24

CURRENT HARVEST AND YEAR 2000 GOALS FOR THE YAKUTAT AREA



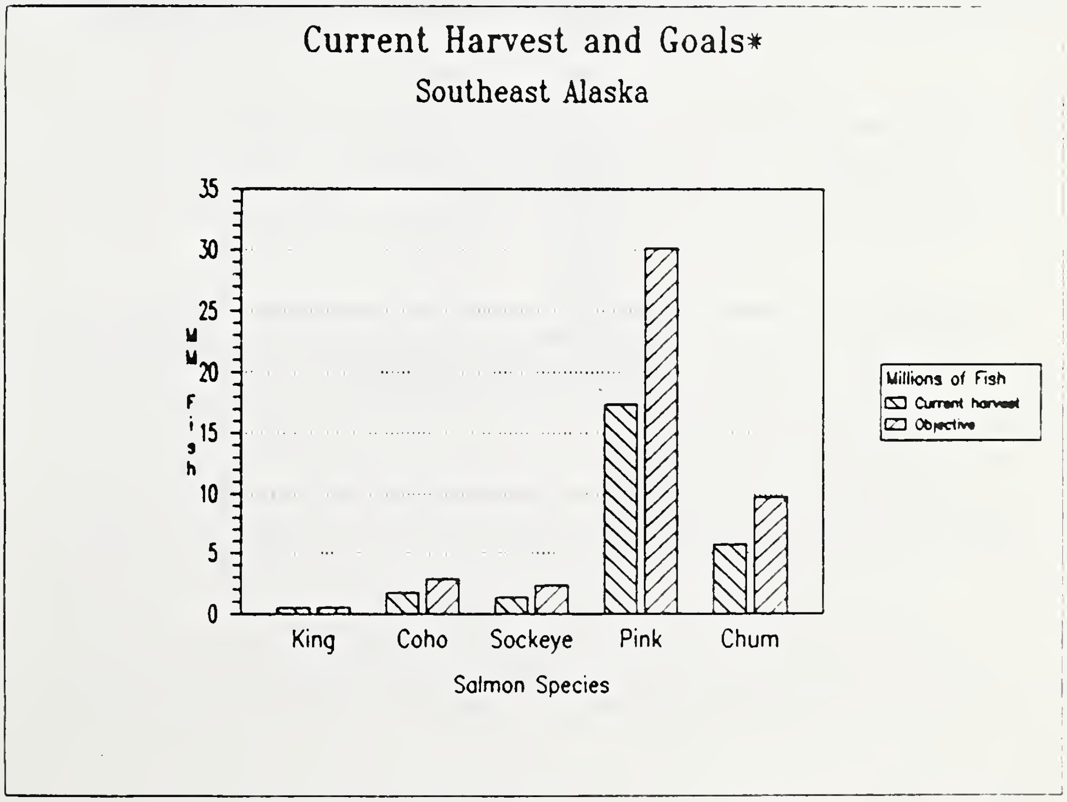
The planned harvest objective (Year 2000 goal), shown in Table 3-43 and Figure 3-25, summed for all of Southeast, can be considered to be the demand for commercial fish, in the context of Forest Planning, for the year 2000. The shortfall is the Demand GAP. Note that some of this production will come from habitats, hatcheries, and other facilities, that are either not located on the National Forest or result from investments other than the National Forest Service (such as private non-profit aquaculture facilities and State of Alaska hatcheries). Comparison of tables 3-41 to 3-43 show that the same shortfall in production applicable to Southeast Alaska, excluding Yakutat, is generally applicable to Southeast Alaska in its entirety. Table 3-43 and figure 3-25 show that for Southeast Alaska king salmon production is at approximately the goal set for the Year 2000. All other salmon species are between 58 and 61 percent of their year 2000 production goal.

TABLE 3-43
GAPS IN YEAR 2000 FISH PRODUCTION FOR SOUTHEAST ALASKA (Number of fish) 1/

	Present Harvest1/	Year 2000 Goals	GAP	Percent
King Salmon	494,663	544,000	49,337	91
Coho Salmon	1,710,043	2,825,000	1,114,957	61
Sockeye Salmon	1,343,618	2,325,000	981,382	58
Pink Salmon	17,394,080	30,150,000	12,755,920	58
Chum Salmon	5,703,535	9,713,000	4,009,465	59

1/ Notes and sources: see Tables 3-39a and 3-39b.
2/ Present harvest represents "present potential harvest for Southeast Alaska, excluding Yakutat. See notes in Table 3-39a.

FIGURE 3-25
CURRENT HARVEST AND YEAR 2000 GOALS FOR SOUTHEAST ALAKSA 1/



SPORT FISH

Sport fish demand was calculated using past sport fishing use and projecting population changes from the locations where the sport fish demand is generated. A basic assumption is that future demand will remain constant on a per user basis. Data for current use and origin of that use was obtained from Michael J. Mills (Alaska Department of Fish and Game 1989). The data are presented in Table 44, and are shown graphically in figure 26. Further information is available in appendix B.

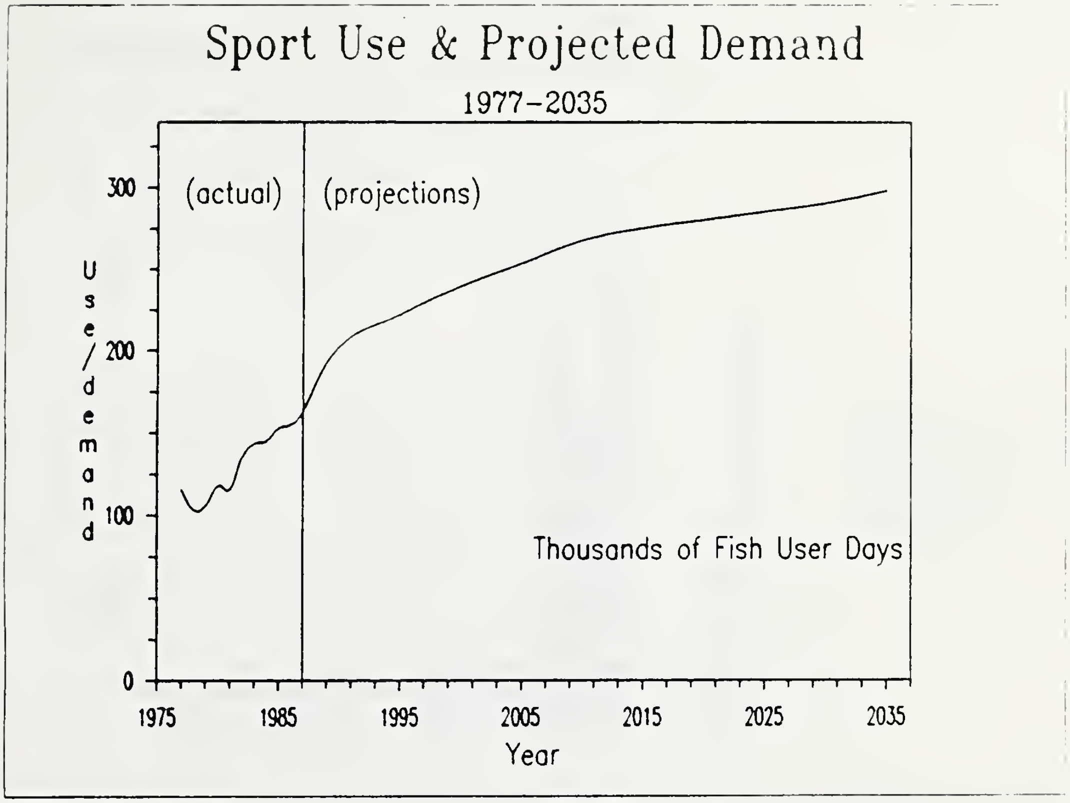
Sport fish use is almost always a very small portion of the total anadromous fish harvest. The majority (usually as great as 95 percent) of the harvest is commercial fish. As the demand for sport fish increases allocation changes of fish resources may be required. These changes would occur through actions of the Alaska Department of Fish and Game, the Board of Fisheries and the Alaska State Legislature.

TABLE 44
SPORT FISH USE AND PROJECTED DEMAND IN THOUSANDS OF FISH USER DAYS

Year	Use/demand	
1977	115.5	
1978	103.3	
1979	106.1	
1980	117.8	
1981	115.7	
1982	135.2	
1983	143.4	
1984	145.0	
1985	152.7	Annual use from
1986	155.1	sport fish surveys
1987	163.2	
1990	202.1	Projected
1995	222.0	Demand
2000	239.3	
2005	253.5	
2010	267.7	
2015	275.3	
2020	280.4	
2025	285.4	
2030	290.5	
2035	298.1	

Source: (Alaska Department of Fish and Game (Mills 1989) and calculations described in Appendix B.

FIGURE 3-26
SPORT FISH USE AND PROJECTED DEMAND IN THOUSANDS OF FISH USER DAYS 1/



1/ The vertical line is the dividing line between actual use information prior to 1987 and projected use beyond 1987. Data is from the Alaska Department of Fish and Game (Mills 1989).

SUMMARY

Comparison of current harvest and the goals for fish production were presented in Tables 3-41 to 3-43. These tables indicate that harvest is approximately 10 percent below the targets set by the Regional Salmon Planning Teams for king salmon, and approximately 40 percent percent below the targets for the other species of salmon.

Under the current management situation, the Tongass National Forest is estimated to be capable of producing commercial harvests of fish as shown in Table 3-45. Figure 3-27 shows the information from Table 3-45 graphically. The illustrations compare the estimated capability of the Forest with the goals for production set for the Year 2000 by the Regional Salmon Planning Teams and the current harvest. When reviewing these illustrations, it is important to take the effect of hatcheries into consideration. Hatcheries supply a portion of the current harvest, and are expected to supply a considerable portion of the Year 2000 goals. Hatcheries are not included in the estimated National Forest habitat capability.

In order to attain the Year 2000 goals, a combinations of strategies will be necessary, including enhancement on National Forest system lands. Other strategies may include the construction or expansion of hatcheries, construction

of enhancement projects on non-Federal lands, changes in fishery management, or other as yet undetermined enhancement methods (reviewed in the Regional Salmon Enhancement Plans).

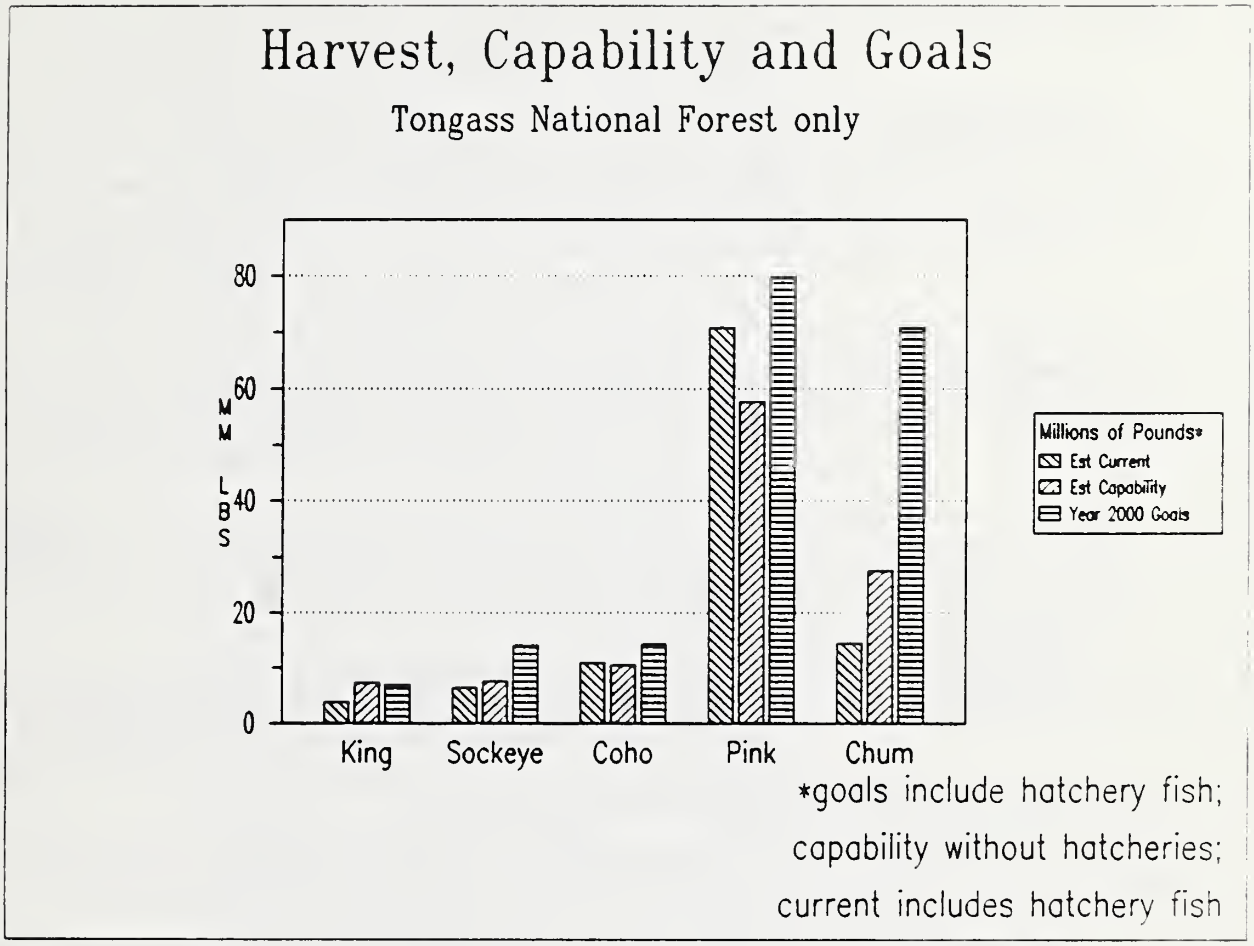
TABLE 3-45
ESTIMATED HARVEST, CAPABILITY AND YEAR 2000 GOALS (Thousand Pounds of Fish)

	Tongass National Forest		
	Estimated Current Harvest1/	Estimated Capability2/	Year 2000 Goals3/
King Salmon	3,810	7,259	6,920
Coho Salmon	10,874	10,475	14,322
Sockeye Salmon	6,404	7,589	14,012
Pink Salmon	70,772	57,703	79,596
Chum Salmon	14,414	27,581	70,711
Total	106,274	110,607	185,561

1/ Commercial fish harvest from southeast Alaska, averaged for 1978-1987, multiplied by a factor of .8 to represent National Forest habitats. These figures include production from hatcheries. Source: Table 3-22.
2/ Estimated capability of National Forest habitats to produce salmon. This does not include production from hatcheries. Coefficients used to transform smolt habitat capability to numbers of harvestable adult are included in the text. Harvest ratio comparisons between modeled and not modeled species are made for king, sockeye and chum salmon based on an indicator of maximum habitat capability (highest annual average consecutive 30 year harvests recorded in Southeast). Coho salmon are used for comparisons for king salmon (both are rearing dependent), and pink salmon are used for comparisons for chum and sockeye salmon (species which would likely primarily be affected by forest management's affects on spawning habitat).Sources: Fish habitat models; Joint Southeast Alaska Regional Planning Teams, 1981 (Comprehensive Salmon Plan for Southeast Alaska, Phase I).
3/ Goals for the Year 2000 as developed by the Regional Planning Teams and multiplied by a factor of .8 to represent National Forest habitats. These figures also include production from hatcheries. Source: Northern Southeast Regional Planning Team, 1987. 1987 Update and 5-Year Action Plan for Salmon Enhancement of the Northern Southeast Alaska Comprehensive Salmon Plan (Phase II).

FIGURE 3-27

ESTIMATED HARVEST, CAPABILITY AND YEAR 2000 GOALS (Millions Pounds of Fish)



EXISTING DIRECTION LEGISLATIVE

A number of Acts of Congress include direction for the evaluation, treatment and/or maintenance of fish habitats in general, or specifically, on the National Forest. Most of these, such as the Clean Water Act and the National Forest Management Act apply nation-wide. However, for the Tongass, there is specific direction for the management of fisheries and fish habitat, and it is this direction that will be covered in this section.

ANILCA

The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) includes three sections which specifically refer to the fish resource on the Tongass National Forest. In addition to these sections, 505, 507, and 1315, other sections refer to fish uses (both commercial fish and subsistence) and habitat. This portion of the AMS gives a brief overview of applicable sections of ANILCA.

Section 505

Section 505, titled "Fisheries on National Forest Lands in Alaska," states in part (a) that: "The Secretary of Agriculture shall ... maintain the habitats, to the maximum extent feasible, of anadromous and other foodfish, and ... maintain

the present and continued productivity of such habitat when such habitats are affected by mining activities..." Part (b) specifically describes fish requirements resulting from mining operations in the Quartz Hill Area of the Tongass National Forest.

Section 505, then, requires the maintenance of habitats, to the maximum extent feasible, when the habitats are affected by mining activities.

Section 507

Section 507, titled "Cooperative Fisheries Planning," requires a cooperative planning process for the enhancement of fishery resources on the Tongass National Forest. In addition, this section requires that a report on the status of the planning processes be included in National Forest Management Plans. This report should include, but not be limited to, a description of current hatchery and aquaculture projects, an analysis of their success of these projects, and a prioritized list of projects anticipated for the duration of the management plan.

Title VIII

Title VIII of ANILCA, Subsistence Management and Use, describes the role and priority of subsistence users in the State of Alaska. It is the policy of Congress that, "the utilization of the public lands in Alaska is to cause the least adverse impact possible on rural residents who depend upon subsistence uses of the resources of such lands......"

Fish are one of the primary subsistence resources in Southeast Alaska, therefore the policy of Title VIII is to be considered in all land management actions on the Tongass National Forest.

Section 1315

Section 1315, titled "Wilderness Management," permits the Secretary of Agriculture to allow fishery research, management, enhancement, and rehabilitation activities within National Forest wilderness, in accordance with the goal of restoring and maintaining fish production in the State of Alaska to optimum sustained yield levels.

This section specifically applies to the State of Alaska and not to areas outside of Alaska in the National Forest Wilderness Preservation System.

ADMINISTRATIVE
Planning documents

Current direction for management of the fish resources on the Tongass comes from a number of different sources, including the Alaska Regional Guide (1983), the Tongass Land Management Plan (1979), handbooks and manuals. Appendix B of the Final Environmental Impact Statement for the Alaska Regional Guide (1983) lists policy comparisons between the Southeast Area Guide (1977), the Alaska Regional Guides and Forest Plans. Briefly, the policies include:

- coordination with other agencies;
- the recognition of fishery resources as a major component of the National Forests;
- designation of any lake or stream on National Forest land which support anadromous or resident fish as fish habitat;
- planning at other levels, such as implementation;
- the designation of Fish Habitat Management Units (FHMU)
- practices to be followed when either timber harvest or road activities may affect fish habitat;
- methods for insuring that land use activities in or affecting FHMU's are carried out in full compliance with applicable plans and policies;
- the selection and monitoring of Management Indicator Species.

The Regional Guide (1983) states that a FHMU is that portion of land, including the stream channel and the streambanks, defined for the protection of stream habitat and maintenance of stream productivity. The Guide requires special consideration to that area at least 100 feet on either side of the stream, and that within this FHMU timber management practices and other land use activities are prescribed to meet the management goals for fish.

The management goal in the Regional Guide (1983, page 3-4) that specifically refers to land and water states: "Maintain and enhance the capability of National Forest System lands and water to efficiently produce and sustain the wildlife and fish populations, species diversity, and distribution mutually desired by the Forest Service and the Alaska Department of Fish and Game in response to public demand."

The Tongass Land Management Plan (1979, p. 92) calls for the full protection of all fish habitat by stating: "The Forest Service's goal is to 'protect and/or enhance fish resources and their habitat' (Area Guide, p. 79). Stated another way, the goal is to preserve the biological productivity of every fish stream on the Tongass."

Handbooks and Manuals

The direction for full protection of fish habitat is restated in the Aquatic Habitat Management Handbook, FSH 2609.24, June 1986, on page 60.6--1. The Handbook identifies prescriptions to be followed, by stream class, in order to meet the objectives of the Regional Guide and the Tongass Land Management Plan. In particular, prescriptions are identified to respond to the following management concerns: channel stability, stream temperature, primary and secondary productivity, large woody debris sources, fish passage, water quality and timing of instream operations.

Retention

The Winter 1985-1986 Amended Tongass Land Management Plan (USDA Forest Service, Alaska Region, Admin. Doc. Number 147) includes two sections which describe the process to be followed in implementation of the Tongass Land Management Plan in order to provide for wildlife and fish habitat protection in LUD III and IV areas to be harvested. These sections are found in the Tongass Land Management Plan Amendment on pages 201-203 and in Appendix D.

These sections of the amended TLMP direct the designation of Fish Habitat Management Units (FHMU). Within the FHMU, portions of old-growth Commercial Forest Land (CFL) timber shall be retained, or not harvested, in order to provide for key habitat for selected management indicator species. The acres not harvested are called "retention" acres. These sections require the number, condition and location of operable CFL retention acres to be determined for Monitoring and Evaluation purposes. For further information on retention, see the wildlife and timber sections of this document.

RESULTS OF TLMP IMPLEMENTATION

The Tongass Land Management Plan included one management output displayed for the fish resource: fish habitat improvement - anadromous. The average annual output rate proposed by TLMP ranged from 263,000 pounds to 1,516,000 pounds on an annual basis. The numbers of pounds improved between 1980 and 1989 were shown in Table 3-30. The table indicates an estimated 7,169,400 pounds of anadromous fish habitat improvement, or an average of 716,940 pounds of fish per year. This is approximately 2.73 times the low output estimated by TLMP and .47 times the high output estimated by TLMP.

The Tongass Land Management Plan, in the Winter 1985-1986 amendment (USDA Forest Service, Alaska Region, Admin. Doc. Number 147), required the monitoring of acres of retention in Fish Habitat Management Units (FHMU's) (page 203, 211 and Appendix D). Of the 23,000 acres of total retention to be identified in management area NEPA analysis and project NEPA analysis, about 32 percent had been identified in 1985 and 55 percent by 1987 [USDA Forest Service 1985, 1987 (Status of the Tongass National Forest Reports)]. Specific retention for FHMU's has not been identified Forest-wide. However, implementation direction in the Aquatic Habitat Management Handbook (USDA Forest Service, 1986) has indirectly assigned specific FHMU acreage to retention, when activities are proposed within the vicinity of the FHMU.

The Tongass Land Management Plan's stated goal was to "preserve the biological productivity of every fish stream on the Tongass" (1979, page 92). Management methods have changed over time as more and more becomes known about the habitat requirements of fish. Habitat models have predicted the capability of the Tongass National Forest for management indicator species (Table 3-46) prior to significant timber harvest on the Tongass (1954), in 1979 at the time of implementation of the Tongass Land Management Plan, and in 1988 (current time). As of 1988, the capability from 1954 has been reduced due to the effects of timber harvest and the use of harvest techniques now known to reduce capability. One example of the methods used was timber harvest to the stream edge on both sides of anadromous fish streams over extended distances. Table 3-46 shows the capability in 1954, 1979 and 1988, as modeled. The table also indicates the percentage change in capability of the Forest.

According to the fish habitat capability models, Forest-wide there has been a reduction of .21 percent in coho capability and .18 percent in Dolly Varden capability since the implementation of the Tongass Land Management Plan in 1979. Reductions in pink salmon have not been predicted (see discussions in previous portions of this text). On a localized area, for instance in a specific watershed, the reductions in capability can be expected to be greater than shown Forest-wide; however, since only a small portion of the Forest has been roaded or harvested (see timber and roadless portions of this document), the small affect on fish habitat capability when averaged across the entire Forest appears to be reasonable.

Corresponding to the reductions in habitat capability have been tremendous increases in numbers of fish harvested, by commercial, sport and subsistence users (as previously discussed). This indicates that habitat availability does not appear to limit harvest, at this time.

TABLE 3-46
HABITAT CAPABILITY CHANGES SINCE 1954 FOR MANAGEMENT INDICATOR SPECIES (MFish) 1/

Administrative Area	Year	Pink Salmon (Thousands of Smolts)	Coho Salmon (Thousands of Smolts)	Dolly Varden Char (Thousands of Fish)
Chatham	1954	1,265,362	8,466	32,899
	1979	1,265,362 2/	8,449	32,797
	1988	1,265,362 2/	8,432	32,752
Stikine	1954	520,144	5,088	14,213
	1979	520,144 2/	5,069	14,094
	1988	520,144 2/	5,063	14,077
Ketchikan	1954	608,061	5,518	20,817
	1979	608,061 2/	5,457	20,630
	1988	608,061 2/	5,441	20,570
FOREST TOTAL	1954	2,393,567	19,072	67,929
	1979	2,393,567 2/	18,975	67,521
	1988	2,393,567 2/	18,936	67,399
FOREST TOTAL % reductions from 1954 3/	1979	0 2/	.51%	.60%
	1988	0 2/	.71%	.78%
FOREST TOTAL % reductions from 1979 4/	1988	0 2/	.21%	.18%

Source: Models described previously in this document.
1/ These estimates of fish capability to not include any increases resulting from fish habitat improvement projects. For coho and pink salmon, figures including fishway enhancement are available in Tables 3-32 and 3-37(a). No additional habitat has been made available for Dolly Varden char due to fishway construction.
2/ No changes in capability are indicated for pink salmon. Table 3-32 indicates pink salmon habitat capability as a result of fishway construction. Effects on pink salmon due to timber harvest and other land management activities have not been determined. The capability model is also under further review to understand the distribution of predicted capability between northern and southern Southeast Alaska, and how the predicted values differ from current harvest.
3/ Since the beginning of large scale industrial timber harvest on the Tongass.
4/ Since the implementation of the Tongass Land Management Plan.

OPPORTUNITIES

There are opportunities in the Revision of the Tongass Land Management Plan to select a preferred alternative that addresses fish habitat and production in a number of different ways. Standards and guidelines for fish habitat and water quality management that maintain and enhance fish resources can be developed. Options for habitat management include maintaining the status quo, allowing slight additional reductions in fish habitat capability, and to provide for considerable increases in fish production. Some members of the public (Tongass Land Management Plan Revision Scoping Database 1988), as well as federal agencies (National Marine Fisheries Service 1988), have requested no harvest buffer strips

along all streams (some advocate no harvest along all anadromous fish streams, some along any fish streams, and others along all streams with or without fish). There is the opportunity to allocate all, or select, stream side areas to allow no timber harvest.

Increases in fish production would result from protection of the currently existing habitat, combined with rehabilitation of previously impacted areas and the development of fish enhancement projects. A preliminary listing of potential fish enhancement projects has been made. Table 3-47 displays these preliminary opportunities by Administrative Area of the Tongass; these values are also displayed graphically in Figure 3-28.

TABLE 3-47
HABITAT ENHANCEMENT OPPORTUNITIES FOR A TEN YEAR PERIOD (M Pounds Salmon) 1/

(thousands of pounds)

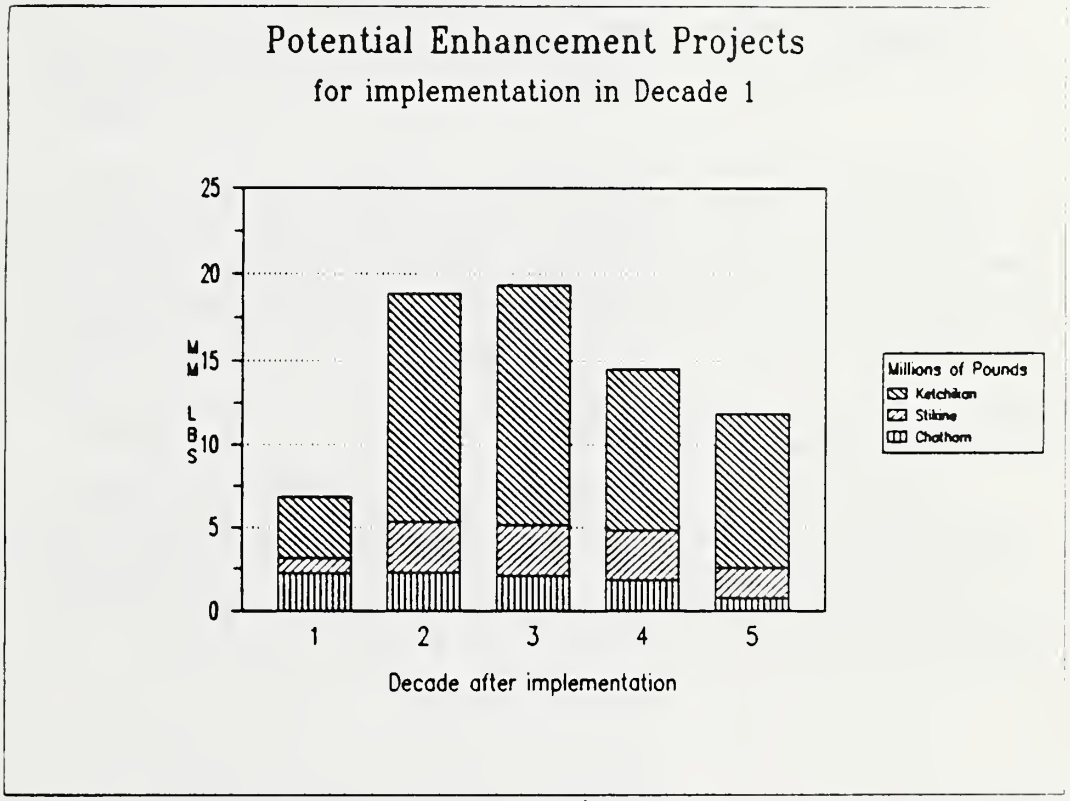
Decade 2/	Ketchikan	Stikine	Chatham	Total
1	3,715	923	2,214	6,852
2	13,536	3,091	2,248	18,876
3	14,194	3,091	2,063	19,348
4	9,709	3,020	1,807	14,536
5	9,303	1,787	752	11,841

Source: Listing of potential projects by the Administrative Areas, on file.
1/ This table shows the number of pounds of salmon enhancement (displayed in pounds available to the commercial fisheries) as a result of implementation of habitat enhancement projects during the first ten years of implementation of a revised Tongass Land Management Plan. These are only estimates, and have not been extensively ground checked. Some of the projects may not be feasible. Some projects may be considered rehabilitation rather than enhancement (for instance the projects designed to rehabilitate woody debris habitat in streams).
2/ Outputs are listed for four decades after implementation of the projects in the first decade. Typically, full project capability takes from 5-20 years to be achieved, depending on the type of project. In this table, maximum benefit of the projects implemented in the first decade is attained in the third decade.

Table 3-47 and Figure 3-28 indicate that approximately 6.5 million pounds of salmon enhancement may be feasible during the first ten years of implementation of the Revised Tongass Land Management Plan. Typically, full project capability takes from 5-20 years to be achieved, depending on the type of project. Therefore, the maximum benefit of the projects implemented in the first ten years is actually attained in the third decade. Approximately 19 million pounds of salmon enhancement, available to the commercial fishery, should be available in the third decade. As stated previously and in the notes on the table, there are a number of caveats to be attached to these estimates. 1) Most of the projects have not been ground checked; 2) The projects have not received project NEPA review; 3) Some projects may be better classified as rehabilitation rather than enhancement; 4) Only theoretically are these numbers of fish available to the commercial fishery -- there are many other factors limiting the actual harvest, such as off-shore survival; 5) No budgetary limitations are included. The identified projects include proposals for enhancement in wilderness areas. The construction of projects in wilderness, although specifically allowed in Section

1315 of ANILCA, has been controversial. Current Forest Service direction is that comparable projects should be implemented outside of wilderness rather than within wilderness. These projects will receive further review prior to the completion of the Final Revised Plan, and their implementation.

FIGURE 3-28
HABITAT ENHANCEMENT OPPORTUNITIES FOR A TEN YEAR PERIOD (MM Pounds Salmon) 1/



Source and Notes: See table 3-47.

INSECTS AND DISEASE

OVERVIEW

The Forest Service conducts annual aerial surveys to locate insect and disease infestations on 30 million acres of National Forest, other federal, Native, state, and private lands in Alaska. In 1988, about one million acres were found to be infested with insects or diseases. The major pests detected in Southeast Alaska are discussed below.

SUPPLY/INVENTORY

CURRENT POPULATIONS

Hemlock Sawfly, Neodiprion tsugae (Middleton) - Populations of the hemlock sawfly were at low levels in 1988. No visible defoliation was detected in 1988, compared to 2,000 acres in 1987. The last major infestation, 1983 to 1985, produced top-kill and tree mortality on more than 14,000 acres throughout Southeast Alaska. This insect reduces the amount and value of the timber resource and is a short-term negative impact on visual quality.

Spruce Beetle, Dendroctonus rufipennis (Kirby) - In Southeast Alaska, spruce beetle activity was low in 1988. Light additional spruce mortality occurred in Glacier Bay National Park, but the total affected acreage did not expand appreciably from the previous year. Slightly over 18,000 acres have been affected in the Park; mortality ranges from 5 percent to 75 percent of the trees in nearly pure stands of Sitka spruce. Small patches of older spruce mortality are evident along the outer coast of Glacier Bay National Park from Dundas Bay to Palma Bay. These patches total less than 500 acres, and do not appear to be expanding.

The spruce beetle has the potential of becoming a serious insect pest of unmanaged young-growth Sitka spruce in Southeast Alaska. The potential loss could reach 50 to 75 percent of all young-growth Sitka spruce stands on the Tongass National Forest. This could represent a substantial loss in the amount and value of the timber resource, a long-term negative impact on recreation and aesthetics, and a negative impact on wildlife habitat.

Hemlock dwarf-mistletoe, Arceuthobium tsugense (Rosendhal, G.N. Jones) - Dwarf mistletoe is a destructive disease of western hemlock throughout Southeast Alaska as far north as Haines. It is absent further west along the coastal area of the Gulf of Alaska. In Southeast, infestation levels vary in old-growth hemlock stands. Dwarf mistletoe is absent in some stands; in other stands almost every hemlock is infected. Western hemlock trees heavily infected with dwarf-mistletoe can have volume growth reduced by 50 percent over a rotation. Sitka spruce and mountain hemlock are only rarely infected by this parasite.

The spread of dwarf mistletoe to young hemlock stands is often a result of the practice of leaving infected non-merchantable hemlock trees in cutover areas. This practice can have a serious impact on long-term timber volume production, particularly, on lower site quality stands.

Alaska Yellow-Cedar Decline - Decline and mortality of Alaska yellow-cedar continues to be one of the most widespread and important forest diseases in Southeast Alaska. Some 340,000 acres of decline have been mapped during aerial detection surveys. Since the onset of decline about 100 years ago, cedar trees have died every year. In 1988, dying, discolored trees were particularly concentrated on the southern half of Kuiu Island and the northeast portion of Slocum Arm on Chichagof Island. The patterns of tree death and apparent absence of a causative disease suggest that some form of environmental stress may be the source of the problem.

Since Alaska yellow-cedar represents high commercial timber values, this annual mortality results in a significant loss in timber resource values. In addition, substantial acres of old growth cedar forests are dying with little cedar regeneration to replace these forests.

Hemlock Fluting - Hemlocks with fluting have deeply incised grooves and ridges extending vertically along their trunks, a condition that reduces the value of hemlock logs because they yield less sawlog volume, and some of the milled wood contains bark. Fluting continues to be a problem throughout Southeast Alaska. Researchers have recently explored reasons for this trunk deformation and have documented its presence in young hemlock stands. The cause of fluting is still unknown.

Decays - Aside from the Alaska yellow-cedar decline, stem and root decays have a potential of becoming the major disease problem in Southeast Alaska. These diseases will become more prevalent in young-growth spruce and hemlock stands as entries for precommercial and commercial thinning increase. As these organisms spread through stumps and wounds, increased harvesting activities will invariably increase the impacts from these organisms. Timber volumes could be reduced by as much as 20 percent in affected stands.

POTENTIAL

The greatest potential for insect and disease increases is in young-growth stands as they approach maturity. At this time, tree vigor decreases and susceptibility to insects and diseases increases. The spruce beetle especially has the potential to significantly alter the desired condition of these forested areas. Stem decays and root diseases have historically increased with intensified land management activities. The impacts of these insects and diseases can be mitigated through silvicultural techniques. Each insect or disease situation must be treated on a case-by-case basis with treatment designed to reduce impacts of the infestation or infection, and to meet the management goals of the affected area.

DEMAND ASSESSMENT

Not applicable.

EXISTING DIRECTION

In general, native insect and disease infestations in old-growth forests will be allowed to run their course. Tree losses will be accepted, yet harvesting flexibility will be maintained to take advantage of timber salvage opportunities. Insect suppression may be justified in high quality, old-growth stands that cannot be salvaged immediately, or that lie near recreation areas and communities where scenic values are high.

Logging in old-growth timber should be concentrated in the stands that are least able to recover from insect or disease damage and where the greatest losses therefore occur.

Prevention, supplemented by suppression, should be the primary approach to insect and disease management for young growth.

RESULTS OF TLMP IMPLEMENTATION

In the last few years there has been a net decline in insect and disease activity throughout Southeast Alaska. While this decline is associated with natural population cycles and not implementation of the Forest Plan, there is still a need to implement sound silvicultural practices in young-growth stands.

Care should be taken to fully evaluate the effects of uneven-aged management on insects and disease. Even more care needs to be exercised when implementing harvesting strategies outside the bounds of known silvicultural methods (i.e., canopy gap management). In the past, these types of strategies have produced unwanted insect and disease impacts. A good example is the diameter limit cutting in Oregon and Washington in the 1960's that produced stand stuctures which favored the western spruce budworm infestations of the 1980's.

OPPORTUNITIES AND CONCERNS

Integrated pest management is the key to reducing the insect and disease impact on forest resource values. Integrated pest management has been described as a systems approach to reducing pest damage to tolerable levels through a variety of techniques, including predators and parasites, genetically resistant hosts, natural environmental modifications and, when necessary and appropriate, chemical pesticides. State-of-the-art integrated pest management places emphasis on modifying the natural environment through silviculture.

The ultimate goal of silviculture in integrated pest management is the creation of plant diversity both in species mix and in age distribution. Plant diversity provides the greatest opportunity for ensuring a healthy forest. Most insects and diseases are host-specific, or depend upon plants which are under stress. Therefore, increasing species, age class, and structural diversity will decrease losses caused by insects and diseases, and in turn reduce their impacts. Diversity can be influenced through processes outside the control of the land manager (windthrow, wildfire, landslide, etc...) or purposefully directed by the land manager. The National Forest Health Strategic Plan was developed by the Forest Service to provide direction to the field to implement the Chief's policy pertaining to integration of pest management into the practice of silviculture. The Revision, therefore, will include the National Forest Health Strategic Plan as one of the guiding documents to achieving diversity and integrated forest pest management.

Data reliability

Aerial reconnaissance survey data is reliable, particularly for extent and location of insect and disease damage.

RESEARCH NEEDS

The Forest Pest Management program in the Alaska Region was reviewed in 1988. The outcome of the review was an implementation plan which will guide Forest Pest Management for the next 5 years in the implementation of the National Forest Health Strategic Plan. The implementation plan (included as an appendix to this document) outlines the evaluations and studies needed for a fully integrated forest pest management system in the Alaska Region. This plan will be updated at five-year intervals. In addition, the State of Alaska will develop an implementation plan for the State and Private lands of Alaska.

LANDS

INTRODUCTION

In the Lands Section, the same format was followed as other sections, but sections are formatted for each major land use activity. The major activities discussed under the generic heading of Lands, include: special use administration (non-recreation), land ownership administration (State selections, Native selections, and Native allotments), landline location and maintenance, rights-of-way acquired, land ownership adjustments, and transportation and utility systems.

SPECIAL USE ADMINISTRATION

OVERVIEW

Non-recreation special uses include uses for agriculture, community and public information, feasibility surveys and testing, research, cultural resources and historical uses, industrial uses, energy generation and transmission, transportation, communications, and non-power generating water facilities. Recreation related uses, such as outfitter and guide services, lodges and resorts, organization camps, and recreation residences, will be discussed later in this Section.

SUPPLY AND DEMAND

Appendix H shows the number of non-recreation special use authorizations on the Tongass National Forest in Fiscal Year 1989 by use type and administrative area. There are 507 total non-recreation special use authorizations within the Tongass National Forest, of which 275 (54 percent) are located on the Chatham Area, 101 (20 percent) are located on the Stikine Area, and 131 (26 percent) are located on the Ketchikan Area.

Forestwide, the greatest number of authorizations issued are for industrial uses (37 percent). Most of these are for industrial camps on the Chatham Area (Table 3-114). This is likely due to the large number of commercial set net fishing camps at Yakutat.

The second most frequently occurring use category, forestwide, is transportation. These authorizations are primarily road easements and permits. They are fairly evenly distributed across the three administrative areas.

Table 3-48 shows how uses are distributed by major category of use and area on the Tongass National Forest.

TABLE 3-48
NON-RECREATION SPECIAL USE AUTHORIZATIONS IN FISCAL YEAR 89 1/

Use Category	Area Chatham	Area Stikine	Area Ketchikan	Forest Total
Agricultural	11	4	1	16
Community and Public Information	6	1	13	20
Feasibility, Research, Training, Cultural Resources, and Historical	29	9	6	44
Industrial	132	24	31	187
Energy Generation and Transmission	11	2	3	16
Transportation	38	37	36	111
Communications	23	15	23	61
Non-power Generating Water Facilities	25	9	18	52
Totals	275	101	131	507

1/ Data is from Appendix H.

Most energy generation and transmission authorizations are special use permits for powerlines. Most communication authorizations are permits for communication site uses. Most non-power generating water facilities permits are for water transmission pipes less than 12 inches in diameter. Other uses are fairly evenly distributed within the major use categories. Since historical data are not available, projections of future special use demand cannot be made.

EXISTING DIRECTION

Existing direction for management of special uses is located in applicable Federal law, the Code of Federal Regulations (36 CFR 251), Forest Service Manual (FSM) 2700, the Forest Service Special Uses Handbook, and the Alaska Regional Guide. More important management policies include the following direction, from FSM 2700:

1. Approve special use applications for uses that conform to the approved Forest Plan. Other uses may be authorized if they do not conflict with the plan and are compatible with other uses of National Forest land.
2. Do not approve applications for private use of National Forest land if location or development on non-National Forest land is reasonably available.
3. Do not grant special use authorizations primarily to afford the applicant a lower cost or less restrictive location as compared to other reasonable alternative locations. Ascertain evidence of a valid public service need or other justification.
4. Do not issue an authorization merely to accommodate the wishes of an individual applicant. Give preference to special purpose, over single-purpose or private uses. Consider applications for private uses on the basis of the potential injury resulting from denial of the authorization.
5. Limit the area of National Forest System land authorized and the period of time granted to that no greater than needed for the purpose(s) authorized, in terms of protection of the public interest and compatibility with other National Forest System programs.
6. Require payment for, or restitution of, damages arising from authorized uses in all special use authorizations.
7. Require payment in advance of an annual rental fee commensurate with the fair market value of the rights or privileges authorized except where authorized otherwise by statute.

Forest Service Manual 2721.14 (R-10 Supplement 46) provides the following direction, in accordance with Section 1316 of ANILCA, for managing tent platforms and other temporary shelters used for noncommercial sport hunting, sport fishing, trapping, and other noncommercial uses:

> "On all public lands where the taking of fish and wildlife is permitted in accordance with the provisions of ANILCA or other applicable State and Federal law, the Forest Service shall permit--subject to reasonable regulation to ensure compatibility--the continuance of temporary campsites, tent platforms, shelters, and other temporary existing uses, and the future establishment and use of facilities and equipment directly and necessarily related to such activities."

Forest Service Manual 2320 discusses management of Wilderness, including the management of some special uses, within Wilderness.

The Alaska Regional Guide (USDA Forest Service, 1983) provides the following direction for special use authorizations:

1. Uses that can be reasonably accommodated on other lands will not be authorized on National Forest System lands.
2. When permitted by the Alaska Lands Act (ANILCA), allow existing isolated hunter cabins, recreation residences, and residence permits and approved groups of existing recreation residences and residence permits that are subject to the provisions of the permits, unless a higher public need is demonstrated through the Forest planning process. (Cabins in Wilderness are deferred to direction on Wilderness management.)
3. Decisions on occupancy permits will be evaluated for compatibility with long-term public interest, based on a consideration of environmental values, economic feasibility, and a determination of social and economic benefit. Permits will not be approved solely for the purpose of creating business opportunities.
4. Review and adjust special-use fees on a planned basis to comply with the Federal Land Policy and Management Act (FLPMA).

The Tongass Land Management Plan (TLMP) provides the following goals for managing special uses and access within the National Monuments (USDA Forest Service, 1979, Part 2):

1. Existing special use permits will continue under the terms of the permit, unless decisions made as a result of the Monument Management Plans provide otherwise. New permits will be issued on a case-by-case basis.
2. Adequate access to private lands and valid occupancies will be allowed. Routes and modes of travel will be determined by the Forest Service within the purposes of the National Monuments.

TLMP also provides direction to monitor and evaluate special use facilities to determine when modifications are needed to the plan (USDA Forest Service, 1979, Part 2).

RESULTS OF TLMP IMPLEMENTATION

Appendix E of the 1985-86 Amended TLMP (USDA Forest Service, 1985-86) contains a listing of existing electronic communication sites, and designates these sites for future additional joint occupancy and use, as per Forest Service Manual 2720 direction. This listing has been reviewed and updated in Appendix G. It includes both existing sites and those sites previously approved through separate site-specific analysis.

OPPORTUNITIES AND CONCERNS

Special use requests often exceed the Forest Service's ability to adequately address all legal requirements and respond to applicants in a timely manner. The result has been frequent delays in issuing appropriate permits, causing frustration from applicants. Policies and guidelines are often not specific enough to result in consistent decisions from different administrative units. This is partially due to the complexities in the different situations which arise, considering types of uses requested, site-specific environmental concerns, economic concerns, public response, other conflicting uses, prior commitments, and public interest determinations. Degree of specificity in establishing policies for the sake of consistent decisions must be weighed against allowing responsible officials the latitude needed to consider each situation on its merits, to ensure a fair and equitable final decision.

Forest Service Manual 2721.14, R-10 Supplement 46 provides direction to manage temporary facilities for noncommercial uses. This direction could equally be applied to facilities for commercial uses but it is limited to noncommercial uses by manual supplement language. Section 1316 of ANILCA is less restrictive.

There is an opportunity to revise this manual direction to apply to commercial as well as noncommercial special uses which would provide a useful management tool.

The Regional Guide direction allowing existing cabins and residences to continue should be modified to make this provision subject to reasonable regulations. This addition would be consistent with direction for cabins, homesites, and similar structures, located in Section 1303(d) of ANILCA.

RECREATION SPECIAL USES

OVERVIEW

In addition to special uses in Wilderness (See Wilderness Section of AMS), the Tongass National Forest manages a wide array of special uses. Because of the undeveloped character of the Forest, its small resident population and its remoteness from major population centers, some types of special uses, such as developed winter sports areas and year around resorts, have shown only limited demand in the past. The abundant high quality wildlife and fish resources are a major attraction to non-resident use, and there has traditionally been a strong demand for guide and outfitter permits for hunting and fishing activities. The area's historic pattern of development as part of the "last frontier" has also resulted in an abundance of scattered, remote cabins and residences. The Alaska National Interest Lands Conservation Act (ANILCA) of 1980 "grandfathered" most of these existing facilities, and permits were issued for many; however, the number of trespass occupancy cases remains high in some parts of the Forest. Although ANILCA prohibited the issuance of permits for individual recreation cabins, demand for recreation residences and cabins presumably continues to remain high in areas accessible from communities.

The majority of lodges and resorts available in Southeast Alaska occupy private lands that were originally patented for other purposes such as salmon canneries, and most are therefore not managed as special uses. Many that at one time occupied National Forest System lands were selected by the State and by the Native Corporations; Eaglecrest Ski Area near Juneau, for example, was developed under a Forest Service special use permit, later selected by the State, and finally transferred to the City and Borough of Juneau. Demand for resort facilities is high, and many have international reputations. As tourism use has increased, there is growing interest in the ability of the Forest to provide sites for additional resort development, and in marketing partnerships and other actions related to enhancing economic opportunities.

Permitting activities of other agencies could affect the opportunity for development of some recreation opportunities through special use facilities. For example, the State is currently considering application for mariculture operations in a number of bays and estuaries adjacent to the National Forest, some of which also have potential for recreation facilities which could be provided through special use permits.

The Forest has not undertaken a comprehensive analysis of the potential future needs and opportunities for special uses, although some studies indicate a need for future expansion of resort opportunities. Decisions to permit or deny special uses typically occur on a case-by-case basis following the filing of a permit application. This process has worked reasonably well in the past where conflicts with other resource activities were fewer and recreation demand was low. However, as recreation and tourism demands increase and more areas of the Forest are affected by management activities which are perceived to conflict with attractiveness to recreation, there is a growing need to provide positive management direction for the future of the special uses program by identifying

opportunities and seeking private sector "partners" who can provide needed services and facilities.

Management of recreation special uses on the Tongass is governed in part by a number of special provisions in ANILCA. For example, Section 1303 provides specific direction limiting the construction of special use cabins and also provides for the temporary authorization for the pre-ANILCA non-recreation trespass cabins. Section 1307 provides for the continuation of existing pre-ANILCA visitor services in Conservation System units and provides Native and resident preference for new non-hunting and fishing visitor services.

SUPPLY/INVENTORY

Existing

According to the Forest Land Use Reports, there are 173 recreation special use permits currently in effect on the Tongass. These permits do not include "temporary" permits approved at the District level. Table 3-49 categorizes these recreation special uses.

TABLE 3-49
TYPES OF RECREATION SPECIAL USES ON THE TONGASS

	Number by Administrative Area		
Type of Use	Chatham	Stikine	Ketchikan
Isolated Cabin	44	24	- 1/
Recreation Residence	15	4	5
Outfitters and Guides	41	6	5
Shelter	11	10	-
Marina	1	-	-
Boat Dock/Wharf	1	-	2
Resort	1	-	1
Motel/Hotel	1	-	-
Houseboat	-	1	-
Organization Camp	3	1	-
Recreation Event	1	-	-
Target Range	-	1	1
Shop/Store/Office	-	-	1
Club	-	-	1

Source: Forest Land Use Reports - R-10 database
1/ Use types without data (designated by a hyphen) reflect no recorded information.

Annually, approximately $142,227 in fees are generated from the special use program. Of this, about $123,000 (87 per cent) are generated from outfitter/guide permits. In many cases, the cost of processing applications, reviewing and approving operating plans, and managing existing permits for compliance exceeds the revenue generated.

Current Situation

Current trends indicate several areas where special use applications are increasing. Guided trips not related to hunting and fishing are in increasing demand, particularly for sea-kayaking, canoeing, and wildlife viewing and photography. In addition, the State of Alaska is active in supporting efforts aimed at increasing visitation as part of economic diversification. Most non-resident visitors to Southeast Alaska tend to spend relatively little time on the National Forest; there is strong interest in developing opportunities that attract and keep visitors in the area longer. In many cases, visitors prefer trips which afford typical comforts and conveniences for overnight stays, but allow them to access and enjoy wildland settings for day trips. Visitation from foreign countries is increasing rapidly, and requires consideration of a variety

of demands and needs which may not be met by the current array of public and private recreation opportunities.

During the past ten years, Forest Service budgets for recreation have increased significantly. However, the deferred maintenance of existing facilities has absorbed much of the increase with relatively few new facilities constructed. In addition, many State programs have been static or have declined as State revenues have declined since 1985. These trends indicate that successfully meeting public needs in the future will require active cooperation with the private sector, primarily through agreements, partnerships and special use permits.

Potential

Recreation use is projected to increase from about 2.8 million recreation visitor days (RVD) in 1987 to about 4.2 million RVD during the next 50 years. A substantial portion of the increase is expected to be related to tourism development. The recreation "places" inventory indicates there area about 1,300 separate "places" on the Forest which have significant recreation attributes. Many of these sites undoubtedly have potential for recreation facilities managed under special use. While the capacity of these places has been estimated, there has been no analysis of the capacity of these areas for outfitter/guide operations, or attempt to "allocate" the capacity between the outfitted and non-outfitted public.

DEMAND ASSESSMENT

State and Native selections of encumbered lands greatly reduced the number of special use permits administered by the Tongass National Forest. It is likely there will continue to be slow growth in traditional guiding and outfitting. An increasing number of special use applications are for "non-traditional" activities (such as wildlife viewing, canoe trips, etc.). There is a continuing need to reduce the backlog of cases involving unauthorized cabins.

EXISTING DIRECTION

The Tongass Land Management Plan did not specifically "allocate" lands to special uses management, nor did it provide standards and guidelines for special uses management. According to FSM 2720 and related supplemental direction, special use applications are evaluated on a case-by-case basis, with the aim of determining that they provided a needed service to the recreating public that capacity exists for the use, and that the use is an appropriate use of National Forest System Lands.

Section 1301(b) of ANILCA prohibits the approval of new special use permits for private recreation cabins on National Forest System Lands in Alaska, other than those which were under permit before 1980. Section 1303(b) prohibits the construction of new cabins except upon a determination that the proposed construction and use is compatible with the purposes for which the area was established, the use of the cabin is either directly related to the administration of the area or is necessary to provide for continuation of an allowed ongoing activity or use, and the applicant has no reasonable alternative site. Special conditions in ANILCA limit such cabin permits to a non-transferable, renewable, five-year Term Special Use Permit for non-recreational uses. Ownership of the improvements is retained by the United States at the time of permit issuance.

Unauthorized non-recreational cabins that were in existence prior to 1980 were eligible for a non-transferable, renewable, five-year special use permit. The public was notified of the Forest Service's intent to issue special use permits to applicants who owned pre-ANILCA unauthorized non-recreation cabins. Those who applied were authorized lifetime special use permits. (There are still a large

number of unauthorized cabins currently in trespass on the Tongass National Forest.)

The National Recreation Strategy indicated that the Forest Service would increase its cooperation with the private sector to provide needed recreation opportunities for the public through partnerships and improved customer service. The Alaska Region Recreation Strategy states that new recreation opportunities will be implemented through private, local, state and Federal partners, and that a prospectus process will be used to implement appropriate recreation opportunities.

RESULTS OF TLMP IMPLEMENTATION

TLMP and subsequent amendments did not provide direction or monitoring requirements for recreation special uses. There appears to be a need for the Revision to provide general direction for the proactive use of the special use permit process to achieve recreation goals not attainable without the involvement of the private sector. In addition, there needs to be a specific monitoring requirement that recreation providers under special use permit be evaluated as to both the quantity and quality of the service they provide. While there is a general requirement to evaluate, in FSM 2720 under "permit administration" there are no forestwide standards established for certain types of services.

OPPORTUNITIES AND CONCERNS

An opportunity exists for the Tongass National Forest to enter into partnerships with the private sector where identified recreation needs can be met by the issuance of new special use permits for private sector recreation developments or activities.

LAND OWNERSHIP ADMINISTRATION

INTRODUCTION

Many State, community, and private inholdings exist within the Tongass National Forest. Geographically, they are scattered throughout the Forest. These inholdings are the result of State and Native selections, Native allotments, townsite eliminations, homesteads, trade and manufacturing sites, patented mining claims, and other eliminations which resulted in the conveyance of land from Federal ownership under the public land laws. (A conveyance is the passing of title to the land, in this case, from the Federal Government to State or private parties.) Of the various types of eliminations discussed above, three are still being processed which will result in substantial future changes in landownership within the Tongass. These three types are State selections, authorized by the Alaska Statehood Act of 1958; Native selections, authorized by the Alaska Native Claims Settlement Act of 1971 (ANCSA); and Native allotments, authorized by the Alaska Native Allotment Act of 1906. In addition to those lands actually conveyed from Federal ownership, the above three activities have resulted in substantial encumbered acreage (encumbered - title to the land has not passed but certain rights are held by persons or entities other than the landowner) by interests in the land by parties other than the Federal Government. These will be discussed more fully, later in this section.

The Tongass National Forest contains 17,446,595 acres within its boundaries. Of this total, 16,761,472 acres are National Forest System lands, leaving a remainder of 685,123 acres of non-National Forest System lands (USDA Forest Service, undated, Land Areas of the National Forest System).

The Alaska Regional Guide (USDA Forest Service, 1983) provides direction to consider in the Forest planning process, known State selections, Native Corporation selections, and Native Allotment claims.

STATE SELECTIONS OVERVIEW

Section 6(a) of the Alaska Statehood Act of 1958 authorized the State of Alaska to select 400,000 acres of "vacant and unappropriated land from within the National Forests of Alaska, for furthering the development and expansion of Alaskan communities." These selections are in addition to other selection rights on non-National Forest System lands. State selections of National Forest System lands must be adjacent to established communities or be suitable for community development or community recreation. The Statehood Act provides that selections of National Forest System lands are subject to "valid existing rights" at the time of selection, and requires approval by the Secretary of Agriculture. Approval authority has since been delegated to the Regional Forester, Alaska Region. The Statehood Act provided 25 years for the State to complete its selections. This period has since been extended, by Section 906(a) of the Alaska National Interest Lands Conservation Act of 1980 (ANILCA), to 1994. Section 906(f) of ANILCA allows the State to select lands 25 percent in excess of acres of entitlement. (Entitlement in this case, is the right to property or the land the State is entitled to receive under the law). ANILCA, Section 906(k) provides direction for the interim management of lands selected but not yet conveyed. Other Sections within Title IX of ANILCA provide additional direction to assist in implementation of the Statehood Act and ANCSA.

A 1988 amendment to ANILCA provides that the beds of navigable lakes 50 acres or larger, and navigable streams and rivers 198 feet or greater in width, will not be charged against land entitlements in conveyances resulting from Native selections under ANCSA or State selections under the Alaska Statehood Act (ANILCA, Section 901 as modified by Section 101 of Public Law 100-395).

SUPPLY AND DEMAND

The table "Total State Selection Statistics by Areas" in Appendix I shows the number of National Forest acres applied for by the State, acres approved and disapproved by the Regional Forester, acres relinquished by the State, acres conveyed by the Bureau of Land Management, acres approved by the Regional Forester but relinquished by the State, and acres currently under selection and approved by the Regional Forester, as of October 1, 1989. These data are summarized by administrative area within the Tongass National Forest and by National Forest in Alaska, as well as totaled for the Alaska Region. Acreage figures are shown for each individual selection, in the table "Progress Report on State Selections of National Forest Lands, also in Appendix I. Figures displayed in these tables will not necessarily add up horizontally to a meaningful total because the categories reported are not mutually exclusive. These tables are compiled by Forest Service, Alaska Region, lands personnel to track progress of the State selection process. They are updated periodically, as warranted by selection activity and as time permits.

Approximately 221,736 acres (or 55 percent) of the State's 400,000 acre entitlement from within the National Forests, have been conveyed (as of October 1, 1989). This leaves approximately 178,264 acres of remaining entitlement, to be conveyed from within the Tongass and Chugach National Forests. Some additional conveyances will likely be granted to compensate for navigable lakes 50 acres or larger and navigable streams and rivers 198 feet or more in width, in accordance with Section 901 of ANILCA, as modified by Section 101 of Public Law 100-395.

The State had applied for 529,298 total National Forest (both Tongass and Chugach) acres, as of October 1, 1989. Approximately 418,539 of these acres have been approved by the Regional Forester. Approximately 41,188 acres have been disapproved because those selections did not meet the criteria of the Alaska

Statehood Act. The State has relinquished 45,841 acres of prior National Forest selections and 234,510 acres remain as unconveyed valid State selections, approved by the Regional Forester. The above figures will not add up to a meaningful total because the corresponding categories are not mutually exclusive. Some of the acres relinquished by the State had also been approved or disapproved by the Regional Forester and were, therefore, counted in both categories. Some selections, including some of those relinquished by the State, had not yet been acted upon by the Regional Forester.

As of October 1, 1989, the State had applied for 317,567 acres from within the Tongass National Forest. Approximately 265,283 of these acres have been approved on the Tongass, 18,433 acres were disapproved, 24,433 acres were relinquished by the State, and 154,023 acres have been conveyed. Approximately 117,305 acres remained as unconveyed valid State selection, approved by the Regional Forester.

As of October 1, 1989, 60 percent of the total National Forest acreage applied for, was located on the Tongass. Twenty-two percent of this total acreage was located on the Chatham Area, 14 percent on the Stikine Area, and 25 percent on the Ketchikan Area. Remaining selections were located on the Chugach National Forest.

As of October 1, 1989, 69 percent of the total National Forest acreage conveyed, was located on the Tongass. Twenty-five percent of this total acreage was located on the Chatham Area, 16 percent on the Stikine Area, and 29 percent on the Ketchikan Area. Remaining conveyances were located on the Chugach National Forest.

Appendix I shows that as of October 1, 1989, the State had selected 228 sites from within the Tongass National Forest, of which 87 sites were located on the Chatham Area, 41 on the Stikine Area, and 100 on the Ketchikan Area.

From the above summary, we can conclude that the State is essentially finished selecting large parcels of National Forest System lands. This is because, as of October 1, 1989, there were only 178,264 acres remaining to be conveyed to fulfill the State's entitlement and the State had selected 234,510 acres of unconveyed valid selections which have been approved by the Regional Forester. Presumably, most of the remaining 178,264 acres will come from lands already selected.

EXISTING DIRECTION

Existing direction for managing State selections is located in Federal law, FSM 5454, and the Alaska Regional Guide. Forest Service Manual 5454 provides criteria for evaluating State selections. Forest Service Manual direction and an Interagency Agreement of 1968 between the Forest Service, the State of Alaska, and the Bureau of Land Management provide direction for processing State selections.

The Alaska Regional Guide (USDA Forest Service, 1983:3-36) provides the following direction:

> "Work actively with State and local governments for full compliance with the intent of the Alaska Statehood Act. To the extent possible, fulfill the needs for community expansion and recreational areas, as well as for prospective community centers."

RESULTS OF TLMP IMPLEMENTATION

The State selection process is providing for the establishment and expansion of communities in Southeast Alaska, as intended by Congress in the Alaska Statehood Act. Some differences in interpretation have arisen between the Forest Service and the State, which has required litigation to resolve. The two Agencies now share a common understanding of the intent of this Act. The State has proceeded rapidly to complete its remaining selections during 1989.

OPPORTUNITIES AND CONCERNS

There are no current management concerns related to State selections. The selection process is progressing satisfactorily and past concerns have been resolved. Allowances will need to be made in the Allowable Timber Sale Quantity (ASQ), and in other programs, to take into account resources foregone due to lands selected by the State.

NATIVE SELECTIONS OVERVIEW

The Alaska Native Claims Settlement Act of 1971 (ANCSA) authorized the conveyance (passing of title to the land) of approximately 44 million acres of Federal lands within Alaska, mostly to Native corporations which were established under ANCSA. Village and urban corporations were entitled to surface estate. Regional corporations were entitled to subsurface estate of lands conveyed to village and urban corporations and both surface and subsurface estate of other lands which is explained below. To allow Native corporations to meet selection deadlines established by ANCSA, despite uncertainties related to the entitlement and location of lands available for selection, USDI Bureau of Land Management (BLM) Regulations (43 CFR 2651-2653) authorized Native corporations to select lands in excess of their entitlement. This led to selection applications for approximately 90 million acres of land, of which only the actual entitlement would be conveyed to each Native corporation (Faxon and Perkins, 1986).

Thus, BLM was to convey (pass title to) a total of approximately 44 million acres, under ANCSA authority. Village corporations were entitled to acquire the surface estate of approximately 22 million acres of land, and regional corporations to approximately 16 million acres. Section 14(h) of ANCSA authorized conveyance of an additional 2 million acres to specified Native corporations and individuals. Section 19 of ANCSA provided the option for Native village corporations, located on former Native reserves, to acquire title to their reserve lands, in lieu of other ANCSA benefits resulting in the conveyance of an additional four million acres, under ANCSA, Section 19 authority (Faxon and Perkins, 1986).

A separate settlement with the Tlingit and Haida Natives of Southeast Alaska resulted in substantially different entitlements within the Tongass National Forest than those located in other parts of Alaska. Section 16 of ANCSA provided that each of the ten village corporations in Southeast Alaska would receive the surface estate to 23,040 acres of land.

Section 14(h)(1) of ANCSA authorized the one regional corporation in Southeast Alaska (Sealaska Corporation) to receive additional acres of existing cemetery and historical sites.

Section 14(h)(3) of ANCSA provided that the urban corporations of Sitka (Shee Atika, Inc.), Juneau (Goldbelt, Inc.), and other areas (located off of the Tongass National Forest), would each receive the surface estate to 23,040 acres of land.

Section 14(h)(5) of ANCSA provides that individual Natives would be entitled to up to 160 acres of land when they could demonstrate that they occupied the land as a primary place of residence on August 31, 1971.

Section 14(h)(8) of ANCSA provided that each regional corporation would receive a portion of land remaining from the 2 million acres provided under other parts of

Section 14(h) of ANCSA, to be allocated by a formula based on population of the regional corporation.

Native selections have been essentially completed, except for isolated special circumstances; however, entitlements have not all been conveyed. The Forest Service continues to manage lands which are selected, or withdrawn for selection, but not conveyed, subject to restrictions provided by Federal law, regulations, and policy.

ANILCA, Section 506 directed an exchange of lands entitled to Kootznoowoo, Goldbelt, and Shee Atika Corporations (and Sealaska Corporation subsurface rights) which were located on Admiralty Island. The purpose of this legislative exchange was to help preserve the natural and recreational values of the Admiralty Island National Monument while protecting the rights and providing for economic and cultural needs and expectations of the Native corporations involved (ANILCA, Sec. 506). This exchange resulted in increases in the original entitlements provided for Kootznoowoo, Goldbelt, and Shee Atika Corporations, by ANCSA.

A 1988 amendment to ANILCA provides that the beds of navigable lakes 50 acres or larger, and navigable streams and rivers 198 feet or greater in width, will not be charged against land entitlements in conveyances resulting from Native selections under ANCSA or State selections under the Alaska Statehood Act (ANILCA, Section 901, as modified by Section 101 of Public Law (P.L.) 100-395).

SUPPLY AND DEMAND

Table 3-50, "Native Land Selections Statistics, as of December 1, 1989", shows approximate ANCSA entitlements, acres conveyed, and remaining ANCSA entitlements, for surface estate, for each Native Corporation located within the Tongass National Forest.

TABLE 3-50
NATIVE LAND SELECTION STATISTICS

REGION 10
NATIVE LAND SELECTIONS STATISTICS
as of December 1, 1989

Corporation	ANCSA * Entitlement	Total NF Acreage Conveyed	Remaining ANCSA Entitlement
TONGASS NATIONAL FOREST			
SEALASKA CORPORATION	267,249.86± **	238,240.157	29,009.703
Cape Fox	23,040	19,815.045	3,224.955
Goldbelt, Inc.	23,040	30,735.81	0
Haida Corporation	23,040	20,850.16	2,294.06
Huna Totem Corporation	23,040	22,909.34	130.66
Kake Tribal Corporation	23,040	22,502.39	537.61
Kavilco, Inc.	23,040	23,066.885	0
Klawock-Heenya	23,040	22,331.029	708.971
Klukwan, Inc.	23,040	22,907.486	132.514
Kootznoowoo, Inc.	29,150	23,980.0	5,170.0
Shaan Seet, Inc.	23,040	23,292.72	0
Shee Atika, Inc.	23,040	26,296.23	0
Yak-Tat Kwaan, Inc.	23,040	21,837.10	1,202.90
	549,839.86	518,764.352	42,307.153

* Entitlements described in Sections 14 and 16 of ANCSA (does NOT include additional entitlements provided for in ANILCA or other subsequent Federal legislation, except for figures shown for Kootznoowoo, Inc.). Conveyance figures do include acres conveyed under the authority of ANILCA.

** From Section 14(h)(8) - figures aproximate: entitlement will vary depending upon selection of 14(h)(1), 14(h)(2), 14(h)(3) and 14(h)(5) sites.

Table 3-50 shows approximately 267,250 acres of surface estate entitlement (authorized under Section 14(h)(8) of ANCSA) for the one regional corporation, 236,510 acres (authorized under Section 16 of ANCSA and later modified by Section 506 of ANILCA) for the ten village corporations, and 46,080 acres (authorized under Section 14(h)(3) of ANCSA) for the two urban corporations, located within the Tongass National Forest, for a total of approximately 549,840 acres. Approximately 518,764 acres had been conveyed from these authorities, as of December 1, 1989, and approximately 42,307 acres remained to be conveyed to the 13 Native corporations within the Tongass. Most of the remaining unconveyed entitlement belongs to Sealaska Corporation.

The entitlements in table 3-50 have been corrected for adjustments enacted in ANILCA, to Kootznoowoo lands, but they have not been corrected for adjustments to Goldbelt or Shee Atika entitlements brought about through exchanges directed in ANILCA, or for recent adjustments allocated to Sealaska Corporation through reassignment of ANCSA, Section 14(h) entitlement. Although this table does not reflect additional acres gained through these entitlement modifications, it does account for acres conveyed; thus, in some instances conveyances may appear to exceed entitlements. Actual entitlement will further vary depending on lands conveyed by BLM in the future, under ANCSA, Section 14(h). Some additional conveyances will likely be granted to compensate for navigable lakes 50 acres or larger and navigable streams and rivers 198 feet or more in width, in accordance with ANILCA, Section 901, as modified by Section 101 of P.L. 100-395. Also, table 3-50 entitlements and conveyances do not include cemetery and historical sites, authorized under ANCSA, Section 14(h)(1), nor do they include primary place of residence selections, authorized under ANCSA, Section 14(h)(5). Acres conveyed will be further refined as unsurveyed lands are surveyed, resulting in more accurate data becoming available.

The table, "Native Selections Conveyed, as of December 1, 1989)," in Appendix I, shows entitlement, date and instrument of conveyance, and acres conveyed for each Native Corporation on the Tongass National Forest, current to December 1, 1989.

The table, "Cemetery and Historical (14(h)(1)) Sites Conveyed, as of October 1, 1989," in Appendix I, shows the BLM case number, name, date and instrument of conveyance, and acres conveyed to Sealaska Regional Corporation, for each Cemetery and Historical site, by administrative area of the Tongass National Forest (current to October 1, 1989).

Table 3-51 summarizes this information.

TABLE 3-51
Summary of Cemetery and Historical (ANCSA, Section 14(h)(1)) Sites Conveyed, as of October 1, 1989. 1/

Administrative Area	Number of Sites	Acres Conveyed
Chatham Area	18	345
Stikine Area	14	115
Ketchikan Area	29	234
Total Tongass N.F.	59	694

1/ Data is from Appendix I.

The tables in Appendix I were compiled by Alaska Region Forest Service lands personnel to track progress of the Native selection process. They are updated periodically, as warranted by activity and as time permits.

In 1988, the BLM entered into a Memorandum of Understanding (MOU) with Sealaska and three other regional corporations, to reallocate some of the two million acres of entitlement under Section 14(h) of ANCSA. By shifting entitlement from Section 14(h)(1) to Section 14(h)(8), Sealaska Corporation gained an additional 35,500+ acres. Depending on whether or not other regional corporations enter into agreement to reallocate ANCSA, Section 14(h) acres, Sealaska Corporation may receive an additional 10,000 to 30,000 acres (personal communication with John Harmening, USDA Forest Service, Alaska Region, Lands Section, May 11, 1989).

As a result of Admiralty Island land exchanges provided for in Section 506 of ANILCA, Goldbelt, Inc. received an additional 7,696 acres over the original 23,040 acres provided by ANCSA. Under the same authority, Shee Atika, Inc. received an additional 3,256 acres.

Under the authority of ANCSA, Section 14 (h)(5), approximately 320 acres were conveyed to individual Natives on the Tongass National Forest as primary places of residence (from personal communication with John Harmening, USDA Forest Service, Alaska Region, Lands Section, May 11, 1989).

Thus, from the preceding discussion, we can approximate the total corrected acres of entitlement provided by ANCSA and subsequent legislation within the Tongass National Forest (table 3-52).

TABLE 3-52
TOTAL CORRECTED ACRES OF ENTITLEMENT, PROVIDED BY ANCSA

Authority	Entitlement (in acres)
ANCSA, Section 14(h)(1) cemetery and historical sites *	694
ANCSA, Section 14(h)(3) urban corporations of Shee Atika and Goldbelt	46,080
ANCSA, Section 14(h)(5) primary place of residence *	320
ANCSA, Section 14(h)(8) Sealaska entitlement	267,250
Correction to ANCSA, Section 14(h)(8) acres, as per BLM MOU	+35,500
Correction for Shee Atika land exchange (ANILCA, Section 506)	+3,256
Correction for Goldbelt land exchange (ANILCA, Section 506)	+7,696
ANCSA, Section 16 village corporation entitlements as modified by ANILCA, Section 506	236,510
Total ANCSA entitlement (as modified by ANILCA)	597,306

*Since there was no specific entitlement included in ANCSA, Section 14(h)(1) or 14(h)(5) selections (other than 2 million total acres were allocaced for all ANCSA, Section 14(h) selections), acres conveyed were substituted for entitlement for these selections.

Thus, the most current estimate results in a total ANCSA (as modified by ANILCA) surface estate entitlement of 597,306 acres, within the Tongass National Forest.

Approximately 694 acres have been conveyed under Section 14(h)(1) of ANCSA (Cemetery and Historical [14(h)(1)] Sites Conveyed, as of October 1, 1989). Approximately 518,764 acres have been conveyed under Sections 14(h)(3), 14(h)(8), and Section 16 of ANCSA (Native Land Selections Statistics, as of December 1, 1989). This figure includes adjustments made for the conveyance of land

exchanges authorized by ANILCA. Approximately 320 acres have been conveyed under ANCSA, Section 14(h)(5). Total acres conveyed under ANCSA authority (as modified by ANILCA), within the Tongass National Forest is 519,778 acres. Thus, remaining corrected ANCSA entitlement is total entitlement minus acres conveyed, or 597,306 - 519,778 = 77,528 acres remaining to be conveyed by BLM. Approximately 87 percent of the corrected entitlement has been conveyed by BLM. Sealaska Corporation may receive an additional 10,000 to 30,000 acres, depending on reallocation of entitlement authorized under 14(h), ANCSA.

Although approximately 77,528 acres remain to be conveyed to Native corporations located within the Tongass National Forest, many additional acres are still encumbered by Native selections or withdrawals. The total acres encumbered are not known. As Native corporations receive their full entitlement from BLM, these withdrawals will be revoked and the lands restored to unencumbered National Forest status.

The 1979 TLMP accounted for 575,133 acres of Native entitlement, in calculations of future available landbase (from personal communication with John Harmening, USDA Forest Service, Alaska Region, Lands Section, May 11, 1989). However, total ANCSA entitlement, as adjusted by ANILCA exchanges, is 597,306 acres. This means there are 597,306 - 575,133 = 22,173 acres which were not accounted for in calculations of future available landbase by the 1979 TLMP.

EXISTING DIRECTION

Direction for managing unconveyed Native selections under ANCSA is located in applicable Federal law, Federal Regulations (43 CFR 2650), and Forest Service Manual 5454. Generally, third-party interests such as contracts, permits, or easements will be issued on selected or withdrawn lands, only with the consent of the affected Native Corporation. If consent is withheld and there is a pressing public need, the Regional Forester may grant a waiver (FSM 5454), except in instances of timber sale contracts within a timber sale contingency area. Contingency areas on the Tongass currently exist only in the two long-term timber sale contracts, with Alaska Lumber and Pulp Company (now Alaska Pulp Company) of Sitka, and Ketchikan Pulp Company of Ketchikan. In the case of contingency areas, Section 908(b) of ANILCA requires a written agreement with the affected Native Corporation prior to timber harvest activities. Prior to any award of third-party interests on lands withdrawn under ANCSA, Federal Regulations (43 CFR 2650.1) require that views of the affected Native Corporation must be obtained and considered.

The Alaska Regional Guide provides direction to work actively with Native Corporations for full compliance with the intent of the Alaska Native Claims Settlement Act (USDA Forest Service, 1983).

RESULTS OF TLMP IMPLEMENTATION

The 1979 TLMP envisioned the eventual conveyance of 575,133 acres, as a result of ANCSA. Subsequent modifications discussed above have resulted in an estimated ANCSA surface estate entitlement of 597,306 acres to be conveyed, within the Tongass National Forest. The difference is 597,306 - 575,133 = 22,173 acres of Native entitlement, not accounted for in previous planning. Sealaska Corporation may receive an additional 10,000 to 30,000 acres, depending on reallocation of entitlement authorized under Section 14(h) of ANCSA. These acres were also not been accounted for in previous planning (personal communication with John Harmening, USDA Forest Service, Alaska Region, Lands Section, May 11, 1989).

OPPORTUNITIES AND CONCERNS

Although selections have been completed and approximately 87 percent of the entitlement conveyed, BLM has been slow to convey the remaining 13 percent of the entitlement and remove withdrawal restrictions from remaining overselected lands. Overselections are those selections made in excess of an entitlement. They are authorized for Native corporations organized under ANCSA, in Federal Regulations (43 CFR 2650). This has resulted in management restrictions on many additional acres of land, over the 77,528 acres, which will eventually be conveyed. No time limit has been set when these final conveyances must take place and the lands will remain encumbered by Native corporation interests until their entitlements have been fulfilled.

NATIVE ALLOTMENTS OVERVIEW

Native Allotments are authorized by the Alaska Native Allotment Act of 1906. This act provided an opportunity for Native individuals who had occupied lands prior to their designation as a National Forest, to apply to the BLM for conveyance of up to 160 acres under conditions prescribed by the Act and Federal Regulations. If the claim is determined by BLM to be valid, the land is eventually conveyed to the allotment applicant (or the applicant's heir), through a trust relationship between the applicant and the USDI Bureau of Indian Affairs (BIA). ANCSA, Section 18(a) repealed the Alaska Native Allotment Act with the provision that allotment applications submitted prior to enactment of ANCSA (December 18, 1971) could still be processed.

SUPPLY AND DEMAND

Within the Tongass National Forest, there are currently 122 Native allotment applications which are awaiting adjudication by BLM representing 11,910 acres of land. Thirty-two applications, representing 174 acres of land within the Tongass have been conveyed to date by BLM. Table 3-53 below, shows the distribution of these applications, by administrative area within the Tongass.

TABLE 3-53
NATIVE ALLOTMENT APPLICATIONS WITHIN THE TONGASS N.F. 1/

Administrative Area	Applications Pending	Acres Pending	Applications Conveyed	Acres Conveyed
Chatham Area	98	9,134	29	114
Stikine Area	9	1,278	3	60
Ketchikan Area	15	1,498	0	0
Total Tongass N.F.	122	11,910	32	174

1/ From BLM computer printout, dated 4/11/89.

Approximately 80 percent of the pending applications are located on the Chatham Area, 7 percent on the Stikine Area, and 12 percent on the Ketchikan Area. Approximately 77 percent of the pending acres are located on the Chatham Area, 11 percent on the Stikine Area, and 13 percent on the Ketchikan Area.

Of those applications which are still pending, some will likely be adjudicated invalid by BLM and closed without conveyance. Others will be conveyed to the applicant. Until final determinations are made by BLM, these applications are treated as active claims by the Forest Service.

EXISTING DIRECTION

Criteria for processing Alaska Native Allotment applications is located in Federal Regulations (43 CFR 2561). Forest Service Manual 5454 describes Forest Service responsibilities in processing and managing Alaska Native allotment applications. The Forest Service submits recommendations to BLM as to whether or not the applicant meets criteria established by the Alaska Native Allotment Act.

as amended, and subsequent Federal Regulations; and as to whether or not the land requested is "chiefly valuable for agriculture or grazing purposes". The claim is then determined to be valid or invalid by BLM. Allotment applications restrict the management and use of the land involved. Timber harvest, and other resource management activities which may affect the land or resources, are not permitted by the Forest Service, unless the claim has been determined to be invalid by BLM. Roads may be constructed across a claim only after a Deed of Further Assurance has been obtained and recorded or clearance has been received from the Regional Forester. Use and maintenance of existing roads across claims may continue (FSM 5454).

RESULTS OF TLMP IMPLEMENTATION

Implementation of the TLMP and other direction, has not resulted in any conflicts or concerns related to Native Allotments.

OPPORTUNITIES AND CONCERNS

Adjudication of Native Allotment applications by BLM has proceeded slowly and has been plagued by several class action lawsuits which reversed earlier decisions, further delaying the process. Approximately, 11,910 acres of National Forest System lands on the Tongass are encumbered by Native Allotment applications (Table 3-53). Although some unknown portion of this land will likely revert to unencumbered National Forest, until adjudication is completed, management restrictions are imposed on these encumbered lands which will likely affect other Forest programs.

LANDLINE LOCATION AND MAINTENANCE

OVERVIEW

The BLM has primary authority and responsibility for all original landline surveys. The Forest Service submits priorities for survey on National Forest System lands to BLM who then establishes priorities for all survey needs. Through interagency agreement, the BLM marks and posts surveyed boundaries to Forest Service standards. By agreement, state-licensed Forest Service personnel may perform these surveys to BLM standards.

SUPPLY AND DEMAND

The Tongass National Forest currently contains 1,753 miles of boundary line which abuts State or private lands. This figure does not include lands adjacent to Canada or lands managed by other Federal Agencies, such as the National Park Service (NPS) or BLM, nor does it include interior administrative boundaries such as Wilderness or National Monuments. To date, 897 miles have been posted and marked to Forest Service standards and 3,107 corners have been monumented or remonumented, leaving 856 miles of non-standard boundary and 2,725 unmonumented corners. Table 3-54 below shows the distribution of these accomplishments and needs (as of March 8, 1989) by administrative area within the Tongass.

These figures will change as State and Native selections are surveyed. After all State selections, Native ANCSA selections, and Native allotments are conveyed and surveyed, the total miles of boundary line abutting State and private lands could be approximately 3,000 miles. After these surveys, future exchanges and other land ownership adjustments will result in only minor fluctuations.

TABLE 3-54
LANDLINE LOCATION

Area	Boundary Line To Standard (miles)	Boundary Line Non-Standard (miles)	Number Corners Standard	Number Corners Non-Standard
Chatham	434	394	1,413	1,259
Stikine	109	105	394	466
Ketchikan	354	357	1,300	1,000
Total Tongass N.F.	897	856	3,107	2,725

From: Electronic mail communication with Dave Wood, Land Surveyor, USDA Forest Service Regional Office, Alaska Region, dated March 9, 1989.

EXISTING DIRECTION

Forest Service Manual 7150 contains existing direction for landline location and maintenance, including Forest Service standards. It is Forest Service policy (FSM 7152) that:

1. All National Forest System property boundary lines adjoining private, State, and public trust lands, such as Indian Reservations, shall be located, monumented, marked, and posted to prescribed Forest Service standards prior to undertaking land management activities that will occur near or adjacent to the property line, and
2. All land management practices shall use, occupy, and/or protect the land and resources of the United States up to the property line to prevent the creation of a false or misleading use line.

The Alaska Regional Guide (USDA Forest Service, 1983:3-36, 3-37) provides the following direction:

"Survey and maintain boundary lines resulting from State and Native conveyances and boundary lines presenting significant potential management problems on a planned basis. Monitor unsurveyed boundary lines to minimize future problems and assist in establishing survey priorities."

RESULTS OF TLMP IMPLEMENTATION

Implementation of the TLMP and other direction, has not resulted in any conflicts or concerns related to landline location or maintenance.

OPPORTUNITIES AND CONCERNS

Currently the Forest Service program is funded for survey but not maintenance, thus, maintenance needs and accomplishments are actually reflected as resurvey. Since there is a continuing need for landline maintenance, funds should be appropriated for this work. Attempts are being made to obtain future funding for maintenance.

RIGHTS-OF-WAY ACQUIRED

OVERVIEW

Right-of-way is a general term used to describe a right to pass over land of another. Rights-of-way are generally linear in shape, but not always. Specific kinds of rights-of-way include easements, permits, and leases.

The right-of-way acquisition program provides for easements and other rights-of-way acquired by the Forest Service. It does not include rights-of-way granted by the Forest Service to other parties. In addition to rights-of-way acquired annually for future land management activities, easements are generally reserved in documents that convey National Forest lands to other ownerships, under Section 17(b) of ANCSA for Native selections, and under Section 906(1) of ANILCA for State selections. Permits and easements are also acquired from the State of Alaska and other State and Federal agencies for access to tidelands and adjacent submerged lands. (Tidelands and adjacent submerged lands encompass the area from mean high tide to three miles seaward.) Authorizations permitting

activities in this area are commonly referred to as tideland permits, tideland easements, or tideland leases. Collectively, they are called tideland authorizations, which is simply a more generic term.

Transportation and Utility Systems are generally rights-of-way granted by the Forest Service. They are addressed separately in a section to follow under the heading of Transportation and Utility Systems.

The following is a list of permits and other authorizations needed to construct a typical log transfer facility (LTF) on the tidelands:

1. Alaska Department of Natural Resources (DNR) authorization.
   These authorize occupancy of the tidelands. They may be in the form of an easement grant, a lease, a land use permit, or an early entry permit. An easement grant provides for long-term, non-exclusive use by the Forest Service and is issued free of charge. A lease provides for long-term, exclusive use for which a fee is paid. A land use permit provides for short-term use. An early entry permit is simply a land use permit issued to authorize uses temporarily, while a long-term permit is being processed.

2. Department of the Army (DOA) Corps Engineers Permit.
   These permits authorize dredge or fill activities under Section 404 of the Clean Water Act and they authorize structures which may impede navigation under Section 10 of the Rivers and Harbors Act of 1899.

3. Certificate of Reasonable Assurance.
   These are issued by Alaska Department of Environmental Conservation (DEC) under Section 401 of the Clean Water Act. They become incorporated into the Corps of Engineers permit and become a part of it. They certify that there is reasonable assurance the proposed activity will meet or exceed State water quality standards.

4. National Pollutant Discharge Elimination System (NPDES) Permit.
   This permit is issued by the Environmental Protection Agency (EPA) under Section 402 of the Clean Water Act to authorize non-point source discharges. They are incorporated into the Corps of Engineers permitting process but issued as a separate permit.

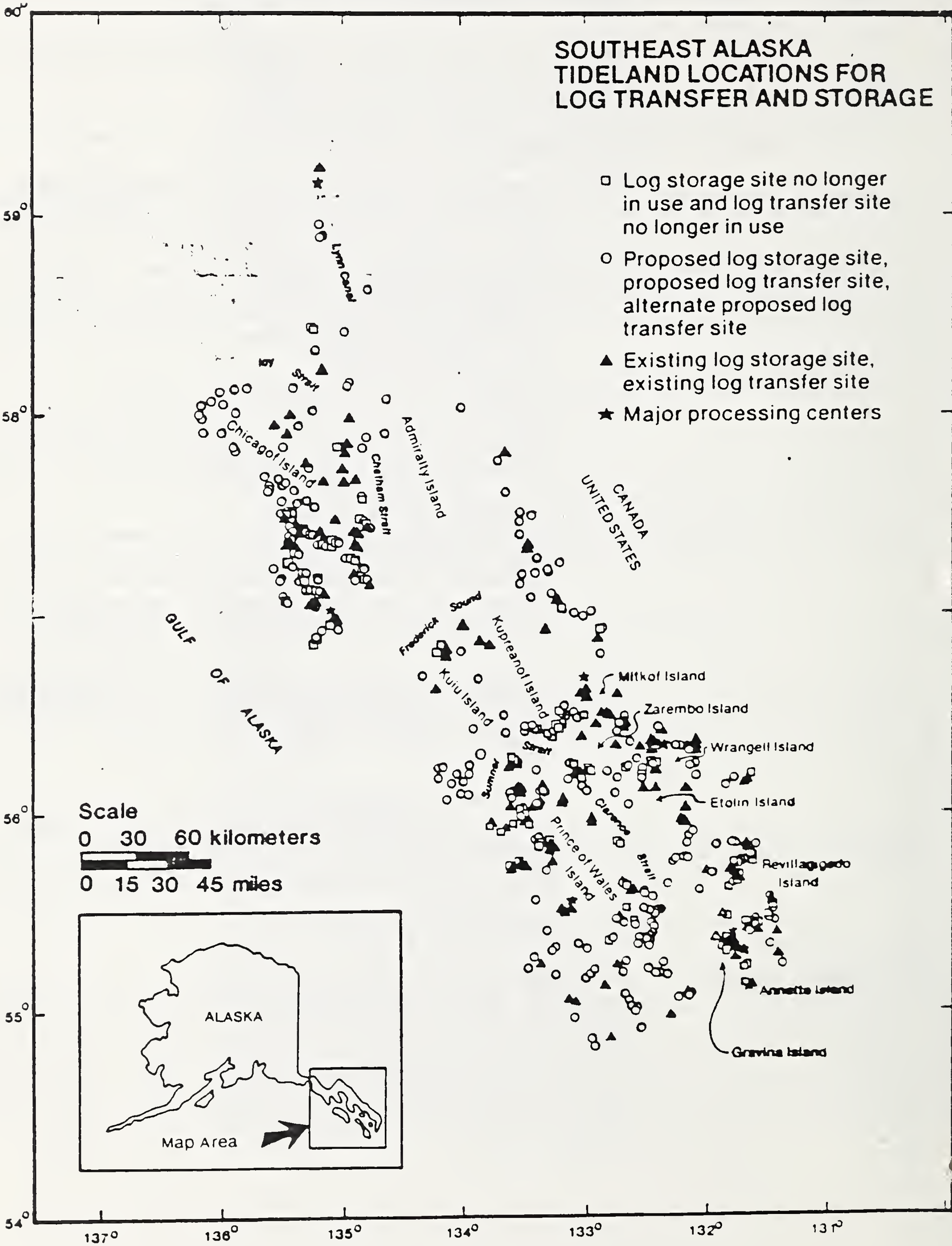
5. Alaska Coastal Zone Consistency Determination.
   These are usually incorporated into the NEPA process. Alaska Office of Management and Budget (OMB), Division of Governmental Coordination agrees, by letter, with a Forest Service determination that activities directly affecting the Coastal Zone are consistent to the maximum extent practicable, with applicable provisions of the Alaska Coastal Zone Management Program.

SUPPLY/INVENTORY

Easements reserved across Native selections under Section 17(b) of ANCSA and those reserved across State selections are not typically reported in annual accomplishment reports, nor are tideland authorizations. Therefore, readily available inventory data is incomplete. Faris and Vaughan (1985), citing Wells (1971), found there were 69 active log transfer and storage facilities and 38 raft collecting and storage facilities in Southeast Alaska in 1971. By 1983, there were 90 log transfer sites and 49 log storage sites. Figure 3-29 shows the geographic distribution of these sites, as well as new sites proposed by Faris and Vaughan, in 1985.

FIGURE 3-29

EXISTING AND PROPOSED LOG TRANSFER/LOG STORAGE SITES IN SE ALASKA, 1983 1/



Faris and Vaughan (1985) found that as of 1983, a total of 228 new log transfer sites and 12 new log storage sites had been identified for possible development over the next 50 years. These sites were proposed by the Forest Service, private landowners, and industry without exclusions applied for economic or environmental reasons. Depending on review by State and Federal agencies and constraints imposed on potential developers, alternative sites were to be chosen and some sites eliminated. See Figure 3-29 for geographic location of these proposed sites.

The Transportation section of this chapter includes a table of the most current (1989) accounting of existing and potential LTF sites on the Tongass. It shows 69 currently existing LTF sites and 33 abandoned sites. An additional 154 sites are located for potential new construction; however, it is unlikely that number would actually be constructed. The geographic location of these currently existing and potential LTF sites is also shown in the Transportation Section, which may be seen for further discussion of log transfer sites and facilities.

Table 3-55 shows the number of tideland authorizations currently held by the Forest Service by permit type and administrative area of the Tongass National Forest.

TABLE 3-55
TIDELAND AUTHORIZATIONS HELD BY THE FOREST SERVICE 1/

Permit Type	Chatham	Area Stikine	Ketchikan	Forest Total
Land Use Permit (Alaska DNR)	2	11	11	24
Easement Grant (Alaska DNR)	18	25	29	72
Corps Permit (Army)	31	42	30	103
National Pollutant Discharge Elimination System (EPA)	1	8	6	15

1/ Data is from area inventories, as of March 1989.

Most of these permits are to authorize LTF sites; however, permits to authorize other activities on tidelands and adjacent submerged lands are also included. These other activities include fishways, mooring buoys, roads, bridge crossings, boat ramps and docks, port facilities, and floating barges.

DEMAND ASSESSMENT

Table 3-56 shows the number of rights-of-way acquired, by administrative area and fiscal year. Miles of right-of-way acquired are shown in parentheses, when this information is available. Table 3-56 was not intended to include data for tideland permits or easements, nor does it include easements reserved from conveyance documents for State or Native selections. It may include some tideland authorizations improperly reported on the annual accomplishment reports.

Table 3-56 shows a high of 25 rights-of-way acquired in 1983, with a recent resurgence of 18 in 1988. The 12 rights-of-way for the Stikine Area in 1983 may have been improperly reported as tideland permits or easements because no mileage was provided in the report. This indicates they may have been tideland easements, even though tideland easements are not normally reported as part of the annual right-of-way accomplishment report.

TABLE 3-56

RIGHTS-OF-WAY ACQUIRED 1/

Fiscal Year	Chatham Area	Stikine Area	Ketchikan Area	Tongass N.F.
1979	0	-	2 (28 mi.)	2 (28 mi.)
1980	0	0	4 (10.5 mi.)	4 (10.5 mi.)
1981	-	-	-	-
1982	-	-	-	-
1983	13 (19.8 mi.)	12	-	25 (19.8 mi.)
1984	1 (.02 mi.)	0	0	1 (.02 mi.)
1985	2 (2.03 mi.)	0	0	2 (2.03 mi.)
1986	0	5 (1.16 mi.)	0	5 (1.16 mi.)
1987	0	3 (7 mi.)	0	3 (7 mi.)
1988	0	3 (3 mi.)	15 (15 mi.)	18 (18 mi.)
Totals	16 (21.85 mi.)	23 (11.16 mi.)	21 (53.5 mi.)	60 (86.51 mi.)

1/ Data is from area annual accomplishment reports.

2/ Years without data (designated by a hyphen) reflect no recorded information.

The data show historical demand for rights-of-way to be highest on the Stikine Area and lowest on the Chatham Area; however, caution is urged in interpretation, because more than half the rights-of-way reported by the Stikine Area may be tideland easements which the other administrative areas were not reporting.

Table 3-57 shows the number and miles of Road Construction and Use Agreements and Agreement Supplements, by area and fiscal year.

TABLE 3-57

ROAD CONSTRUCTION AND USE AGREEMENTS AND SUPPLEMENTS 1/

		Area		Forest
Fiscal Year	Chatham	Stikine	Ketchikan	Total
1979	0	-	1 agreement	1 agreement
1980	0	0	0	0
1981	-	-	-	-
1982	-	-	-	-
1983	-	-	-	-
1984	1 supplement (7.4 mi.)	-	0	1 supplement (7.4 mi.)
1985	1 supplement (1.8 mi.)	0	0	1 supplement (1.8 mi.)
1986	1 supplement (.1 mi.)	0	0	1 supplement (.1 mi.)
1987	1 supplement (LTF site)	0	0	1 supplement (LTF site)
1988	1 agreement 1 supplement (.93 mi.)	0	0	1 agreement 1 supplement (.93 mi.)
Totals	1 agreement 5 supplements (10.23 mi.)	0	1	2 agreements 5 supplements (10.23 mi.)

1/ Data is from area annual accomplishment reports.

2/ Years without data (designated by a hyphen) reflect no recorded information.

Table 3-57 shows historical demand for Road Construction and Use Agreements to be fairly constant between 1984 and 1988. Most of these agreements have been on the Chatham Area.

Historical data for tideland authorizations are not available, so projections of future demand cannot be made. Faris and Vaughan (1985) found the number of active log transfer sites in Southeast Alaska to be related to the volume of timber harvested. They predicted that trends toward sales of smaller volume would result in a large number of permitted LTF sites with each handling a lower volume of timber. This prediction has not materialized due to efforts to minimize the number of LTF sites for environmental reasons.

EXISTING DIRECTION

Existing direction for the acquisition of rights-of-way by the Forest Service is located in Forest Service Manual 5460 and the Rights-of-Way Acquisition Handbook. It is Forest Service policy (FSM 5460) to:

1. Acquire all interests needed for planned and foreseeable future uses during initial acquisitions.
2. Acquire rights-of-way in perpetuity and to accommodate all forms of multiple-use traffic unless the Forest Plan indicates that full use is not required.
3. Recommend condemnation when negotiations fail to secure in a timely manner the rights-of-way needed.
4. When compatible with National Forest management objectives, assist and cooperate with private landowners in the acquisition of rights-of-way needed to develop access for private lands in conjunction with National Forest access.
5. Acquire sufficient interests in rights-of-way for roads expected to receive significant non-Forest Service use, to permit the appropriate public road agency to accept jurisdiction of the road.
6. Consider acceptance of temporary agreements or use rental agreements only where there is an immediate need for temporary access for limited purposes that can be economically met by such procedure, and the foreseeable need of the United States does not justify the expenditure necessary to provide a permanent road or trail.
7. Acquire rights-of-way with the least impact on private lands crossed when economically and environmentally feasible.

RESULTS OF TLMP IMPLEMENTATION

Rights-of-way across State and Native selections have generally been acquired when needed. The State Easement Grant program for access across tidelands has been responsive to Forest Service needs although environmental conflicts or conflicts with other uses sometimes preclude optimum location or the most economic design of facilities. Other needed rights-of-way have been successfully acquired in time to meet project deadlines.

OPPORTUNITIES AND CONCERNS

There are no current management concerns related to rights-of-way acquired, other than those discussed above.

LAND OWNERSHIP ADJUSTMENTS

OVERVIEW

Land ownership adjustments are generally accomplished through land exchanges. Other adjustments include purchase and donation, transfer with other Federal agencies, and condemnation.

SUPPLY AND DEMAND

Table 3-58 displays land adjustments that have taken place on the Tongass National Forest, from Fiscal Year 1981 to 1989. These figures are not reflected in annual accomplishment reporting because most adjustments on the Tongass are authorized by special legislation unique to Alaska, such as ANILCA, ANCSA, and the Haida Land Exchange Act of 1986. Adjustments authorized under these authorities are not reported in annual accomplishment reports.

TABLE 3-58
LAND ADJUSTMENTS ON THE TONGASS NATIONAL FOREST, from 1981 to 1989 1/

Type of Adjustment	Fiscal Year	Acres	Area	Case
EXCHANGE	1981	65,620	Chatham	Off Admiralty Legislative Exchange (ANILCA), 3 cases (Goldbelt, Shee Atika, and Kootznoowoo)
	1984	63	Chatham	Goldbelt ROW Exchange, Sawmill Cove
	1986	2	Stikine	City of Wrangell
	1987	1	Stikine	City of Petersburg
	1988	3,224	Chatham	Hobart Bay Exchange with Goldbelt
	1989	54	Chatham	Shee Atika Cabin Sites Exchange
		4,222	Ketchikan	Haida Exchange
Totals				
		73,186	Forest	9 Cases
		68,961	Chatham	6 Cases
		3	Stikine	2 Cases
		4,222	Ketchikan	1 Case
PURCHASE	1986	4	Chatham	Hoonah Administrative Site
	1988	63	Chatham	Wheeler Creek
		5,417	Ketchikan	Haida (2 Cases)
Totals				
		5,484	Forest	4 Cases
		67	Chatham	2 Cases
		0	Stikine	0 Cases
		5,417	Ketchikan	2 Cases
DONATION	1988	1	Chatham	Dan Moller Ski Trail
TRANSFER	None			

1/ From personal communication with Wayne Ash, USDA Forest Service, Alaska Region, Lands Section, May 15, 1989. Acres reflect acres received by the Forest Service.

Table 3-58 reflects an increase in exchange activity since 1981. During fiscal years 1988 and 1989, three land exchanges were completed totaling 7,500 acres. If the Off Admiralty Legislative Exchanges of ANILCA were not included, these two years would have accounted for 99 percent of the acreage and 50 percent of the cases, over this nine-year period. This trend is anticipated to continue as Native Corporations receive their full entitlement and propose additional exchanges. Of the nine exchange cases processed between fiscal years 1981 and 1989, 73,183 acres (99.99 percent of the total acres) and seven cases (78 percent of the total cases) were with Native corporations. Exchange is the most frequent method used for completing land adjustments.

The Chatham Area processed most of the land exchanges and the Stikine Area, the least. An insignificant portion of the acres and 22 percent of the land exchange cases were located on the Stikine Administrative Area. Ninety-four percent of the acres and 67 percent of the cases were located on the Chatham Area. Fifty-six percent of the acres and 11 percent of the cases were located on the Ketchikan Area.

Due to requirements of the Haida Land Exchange Act of 1986, the Ketchikan Area processed 98 percent of the land purchase acres and 50 percent of the cases. The Chatham Area processed the remaining land purchase acres and cases.

Table 3-58 shows that the workload for land donations and transfers has been fairly insignificant in recent years. This is not expected to change in the near future.

Anticipated Exchanges

A 1976 amendment to ANCSA, Section 16(b), requires consent of the Governor of Alaska for lands selected by and conveyed to Sealaska Corporation from within the Yakutat withdrawal. Consent was granted for Sealaska to file a selection application, through a Memorandum of Understanding and Agreement between the State of Alaska and Sealaska Corporation, dated December 9, 1977. Consent for conveyance of these lands was expressly withheld, pending enactment of a land exchange between Sealaska Corporation and the Forest Service. This conditional consent requires that Sealaska exchange lands selected in the Situk drainage for lands elsewhere (USDA Forest Service, 1979, TLMP FEIS and USDA Forest Service, undated, Situk River Interim Management Plan).

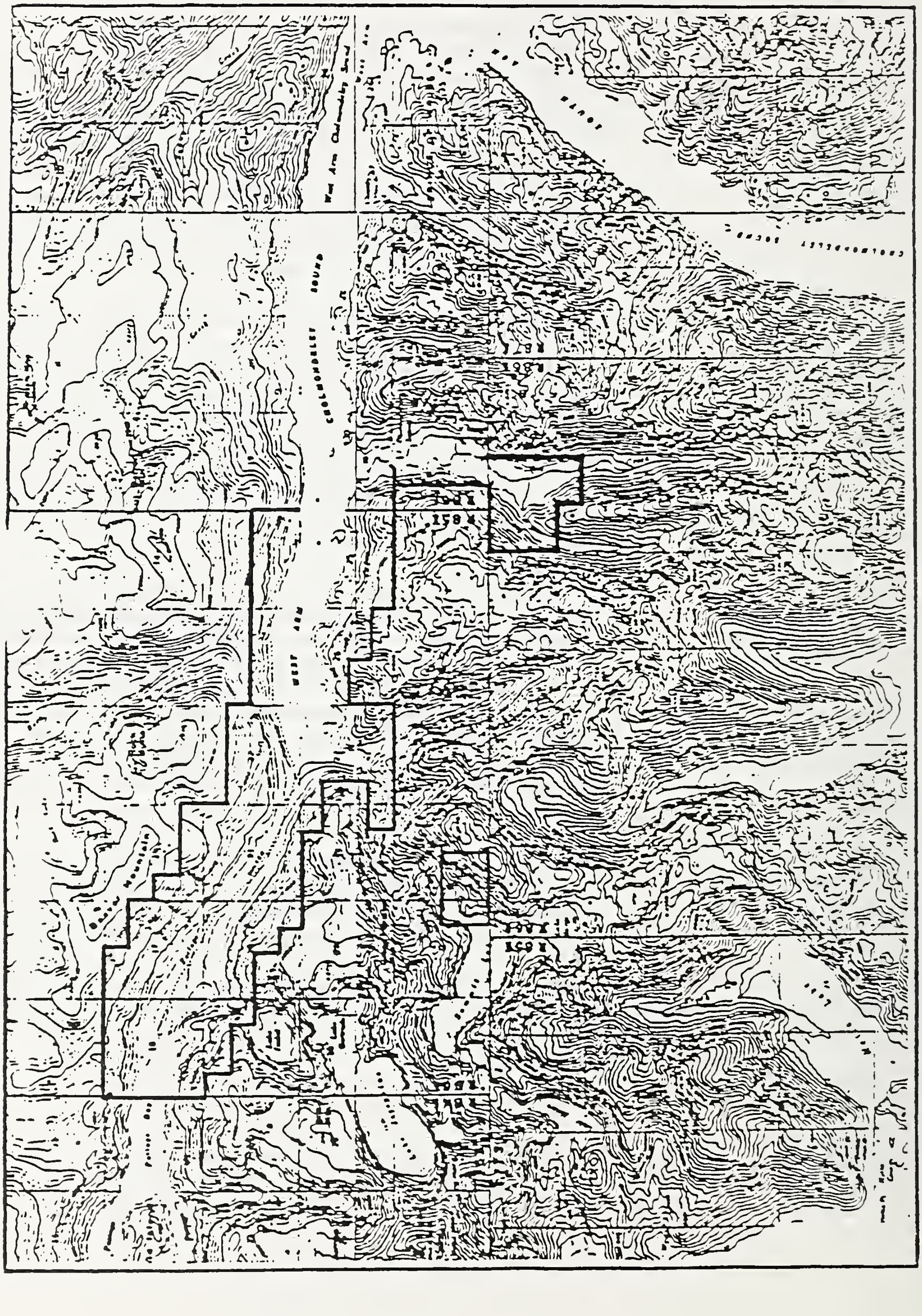
Section 10 of the Haida Land Exchange Act of 1986, provides Haida Corporation the option to exchange lands known as "Haida Exchange Lands" for other National Forest System lands after January 1, 1995. Haida Corporation has informed the Forest Service of their intent to exchange approximately 8,669 acres of surface estate at Portage/Sulzer in Cholmondeley Sound, Prince of Wales Island, under this authority (see Appendix J). Additional acres may be withdrawn by the Secretary of Interior, for this purpose. Figure 3-30 shows the location of lands requested for withdrawal at this time for Section 10 purposes (personal communication with Wayne Ash, USDA Forest Service, Alaska Region, Lands Section, May 15 and 23, and October 17, 1989).

Haida Corporation has identified approximately 100,000 acres of lands of interest to the Corporation which include the general locations of Portage, Karta River, and Nutkwa; however, both the Karta and Nutkwa areas have been proposed in Congressional Bills, as Wilderness. In the event Haida Corporation is successful in acquiring this land, the Forest Service has reserved a 300 foot right-of-way through Sulzer Portage. The Corporation has also requested that the Forest Service program funds to plan a "Cooperative Information and Education Branch" of the Southeast Alaska Visitor Information Center, in Hydaburg (personal communication with Wayne Ash, USDA Forest Service, Alaska Region, Lands Section, May 23, 1989).

Section 4 of the Haida Land Exchange Act of 1986, provides Sealaska Corporation the opportunity to exchange interests in certain subsurface estate, for subsurface lands elsewhere, of equal value. Sealaska Corporation has elected to exchange approximately 4,750 acres of these subsurface interests to the Forest Service, in return for lands of equal value, at an undetermined location which is subject to Forest Service concurrence (personal communication with Wayne Ash, USDA Forest Service, Alaska Region, Lands Section, May 15, 1989).

FIGURE 3-30

LANDS TO BE WITHDRAWN FOR PURPOSES OF SECTION 10 OF THE HAIDA LAND EXCHANGE ACT OF 1986



EXISTING DIRECTION

Existing direction is located in applicable Federal law, such as ANILCA, ANCSA, and the Haida Land Exchange Act of 1986. Further direction is located in Forest Service Manual (FSM) 5400, the Land Acquisition Handbook, and the Alaska Regional Guide. FSM 5430 contains direction for exchange and FSM 5420 for land purchases and donations. It is Forest Service policy (FSM 5403) to:

1. Consolidate National Forest lands within existing National Forest units.
2. Exchange out of lands which have lost their National Forest character or are no longer suitable for National Forest purposes.
3. Through townsite authority, provide communities with opportunity to acquire lands needed for expanding community purposes.
4. Complete land-for-land exchanges to consolidate National Forest and private, State, or local government land patterns; to permit needed urban or industrial expansion; or to make other adjustments in landownership which are clearly in the public interest.
5. Transfer and interchange land with other agencies to consolidate National Forests, to clarify and reduce the cost of administration and protection, and to improve resource conservation and production.
6. Encourage donations of land to consolidate National Forest System lands to improve resource conservation and to obtain land needed for administrative or research purposes. Accept donations of forest and watershed land creating isolated parcels of National Forest with consequent administrative and protection problems only when public values of the donated land fully justify the increased workload.

In Alaska, ANILCA, Section 1302(h) and ANCSA, Section 22(f) (as amended by Section 17 of Public Law 94-204), provide authority for exchange of lands or interests in land, on an equal value basis; with the exception that if the parties agree to an exchange and the Secretary of Agriculture determines it is in the public interest, such exchanges may then be made for other than equal value.

ANILCA, Section 910 provides an exemption from NEPA in some circumstances (FSM 5430).

The Alaska Regional Guide provides the following direction (USDA Forest Service, 1983:3-36):

> "Ownership adjustment needs will be identified as part of the Forest planning process. Emphasis will be directed toward State selections adjacent to existing communities. It is Forest Service policy to work with State agencies and local communities to substantially eliminate Forest ownership in and adjacent to communities where State, borough, or community governmental jurisdiction should logically preside.
>
> Prepare a landownership adjustment plan. Emphasize improved landownership patterns and management opportunities resulting from State and Native land conveyances. Consider acquisition of isolated land in other ownerships at critical locations in light of possible mutual benefit to landowners and the Forest Service."

RESULTS OF TLMP IMPLEMENTATION

Although Alaska Regional Guide direction calls for a landownership adjustment plan, such a plan is not practical until after State and Native conveyances are completed. An exception would be in Wilderness where the State has no additional selection rights and Native Corporations have no rights to additional conveyances. Although disposal of land in Wilderness is undesirable, land acquisition of other ownerships in Wilderness could be prioritized to partially fulfill requirements to identify desired landownership adjustments.

OPPORTUNITIES AND CONCERNS

Requests by proponents for land exchanges often exceed Forest Service ability to properly analyze and respond to these requests. Conveyances of land to Native Corporations have resulted in numerous exchange proposals, as Corporations attempt to acquire lands other than those conveyed. This trend is expected to continue. Political considerations are sometimes a part of these exchange proposals as Native corporations attempt to gain assistance from Congress to achieve their land exchange goals.

Most land adjustments on the Tongass are completed through exchanges authorized by special legislation unique to Alaska, such as ANILCA, ANCSA, and the Haida Land Exchange Act of 1986. Exchanges under these authorities are not included in annual accomplishment reporting, thus, the Forest does not receive credit at higher levels for work accomplished.

TRANSPORTATION AND UTILITY SYSTEMS

OVERVIEW

Transportation and Utility Systems (TUS) are described in the Lands Section of the Forest-wide Standards and Guidelines. These systems are typically major right-of-way corridors, and their associated sites, granted by the Forest Service; however, not all right-of-way grants are TUS's, nor are all TUS's necessarily right-of-way grants. Roads consist of State and Federal Highways, powerlines are 66 kV or greater, and pipelines are 10 inches or more in diameter. Water pipelines greater than 10 inches are included if they are a public utility (i.e., if they service a community water supply). Consult the Transportation Section for additional information regarding transportation facilities.

SUPPLY/INVENTORY

Existing TUS facilities within the Tongass National Forest include those listed below. Additional systems exist off National Forest System lands, such as Highway 37 at Hyder, the Haines Highway at Haines, the Klondike Highway at Skagway, and various hydroelectric projects with their associated powerlines.

Roads:

1. Forest Highway 7 at Petersburg (Petersburg to Dry Strait - 35 miles)
2. Forest Highway 16 at Wrangell (Wrangell to Pat's Creek - 9 miles)
3. Forest Highway 40 at Kake (Kake Ferry Terminal to Portage Bay - 2 miles)
4. Forest Highway 2 at Juneau (Auke Bay to Echo Cove - 24 miles)
5. Forest Highway 37 at Juneau (Mendenhall Loop Road to Mendenhall Glacier - 1 mile)
6. Forest Highway 10 at Yakutat (Yakutat to Dangerous River - 30 miles)
7. Forest Highway 39 at Ketchikan (Ward Cove to the Forest Boundary, past Lake Harriet Hunt - 10 miles)
8. Forest Highway 6 at Prince of Wales Island (Hollis to Klawock and Craig - 31 miles)
9. Forest Highway 9 at Prince of Wales Island (Klawock to Control Lake - 17 miles)
10. Forest Highway 13 at Prince of Wales Island (Forest Highway 6 to Hydaburg - 22 miles)

Railroads:

1. White Pass and Yukon Railroad (Skagway)

Hydroelectric Projects and Powerlines:

1. Tyee (from Tyee Lake, near the Bradfield Canal, supplies power to Wrangell and Petersburg)
2. Swan Lake (near Ketchikan)
3. Snettisham (near Juneau)

The Crystal Lake Hydro Project, on the Stikine Area was not included because associated transmission lines are less than 66 kV.

The Green Lake Hydro Project, near Sitka, was not included because all existing facilities are on non-National Forest System lands. New facilities are proposed which would be located on National Forest Service lands. These are discussed in the following subsection.

Pipelines:

1. Thorne Bay waterline
2. Craig waterline

A more complete and more detailed listing of potential existing and proposed systems is contained in Appendix K, Southeast Alaska Corridor Planning. This should be considered only an inventory of potential TUS's because the systems listed may not all meet TUS criteria, as described in the Standards and Guidelines Section, and above. In addition, many of these systems are located totally, or in part, on non-National Forest System lands. The data was assembled by the Southeast Alaska Corridor Planning Team which consists of representatives of Federal and State agencies, and private corporations. Existing systems are depicted by an "O" under the activity they serve. The Regional Map in Appendix K shows the geographic location of these potential systems.

DEMAND ASSESSMENT

Appendix K identifies the following upland surface transportation corridors, proposed for development within the next 20 years:

1. Upgrade of existing Prince of Wales road system, Kasaan to Thorne Bay and Control Lake to near Point Baker
2. Revillagigedo Island, Ketchikan to Carroll Inlet, and Carroll Inlet to Cow Creek
3. Bradfield Canal to Canada (Money has been appropriated by the Alaska State Legislature to analyze this proposal.)
4. Wrangell to Petersburg
5. Kupreanof Island, Kake to Petersburg
6. Douglas Island, Juneau to Middle Point
7. North of Juneau, Echo Cove to Berners Bay

Pursuant to ANILCA, Section 1113, in 1987, a study was conducted through the Alaska Land Use Council (ALUC) with the Forest Service and the State of Alaska, Department of Transportation and Public Facilities as co-chairs. This study resulted in a report to Congress on the effects of designation of the Stikine-LeConte Wilderness (in ANILCA) upon access to Canada, in the Stikine River region. The report concludes there is reasonable probability that some type of surface access will be needed in the Stikine River region during the next 15 to 25 years (from 1987) and the most economic alternative may require crossing within the Stikine-LeConte Wilderness. The report recommended deferring identification and reservation of a specific route until development needs have progressed to the point where more specific access design requirements could be formulated. Additional recommendations were proposed regarding modification of

procedural requirements for this access (USDA Forest Service, 1987, Stikine River Region Access Study).

The following hydroelectric projects and powerlines have been proposed by the Alaska Power Authority (APA):

Southeast Alaska Transmission Intertie

High probability:

- Black Bear Lake, near Klawock
- Dorothy Lake, near Taku Inlet
- Takatz Lake
- Upper Mahoney Lake

Medium probability:

- Reynolds Creek on Prince of Wales Island, near Hydaburg
- Lake Grace
- Indian River, near Tenakee Springs

Low probability:

- Sweetheart Falls Creek and Lakes, near Port Snettisham
- Swan Lake and Cascade Creek, at Thomas Bay
- Scenery Creek and Scenery Lake, at Thomas Bay

Some of the above sites are located wholly or in part, on State or private lands. Transmission lines associated with the Upper Mahoney Lake and Indian River Projects will likely be less than 66 kV; therefore, these projects would not meet the criteria established for a Transportation/Utility System. Remaining hydroelectric projects proposed above, by the Alaska Power Authority, will likely have associated transmission lines exceeding 66 kV (personal communication with Erik Marchegiani, APA, Anchorage Office, June 22, 1989). Therefore, these remaining projects would meet the criteria for a TUS.

The City of Sitka proposes expanding the existing Green Lake Hydro Project to include a 600 kW transmission line to be located, in part, on National Forest System lands.

Other hydroelectric sites were proposed through the public involvement process of this Forest Plan Revision. These sites include:

- Manzanita, Ella, and Punchbowl Lakes near Ketchikan
- Ruth Lake and Delta Creek at Thomas Bay
- Anita Lake on Etolin Island near Wrangell
- Wolf Creek in Hollis
- Bradfield Canal utility line

Manzanita, Ella, and Punchbowl Lakes are located within lands classified as both Wilderness and National Monument. This would not preclude designation as a TUS but would complicate such designation. Since design and size are unknown for many of the above proposed sites, some of those sites may not qualify as a Transportation and Utility System.

EXISTING DIRECTION

Transportation and Utility Systems are generally authorized by a right-of-way grant. These may be in the form of a special use permit, a temporary permit, a term permit, an easement, or a lease. Existing direction for right-of-way grants is located in applicable Federal Law, Federal Regulations, Forest Service Manual (FSM) 2700, 2720, and 2730, the Road Rights-of-Way Grants Handbook, and the Alaska Regional Guide. FSM 2700 and Alaska Regional Guide (USDA Forest Service, 1983) direction were discussed previously, in the Non-Recreation Special Use Administration Section.

Federal Regulations (36 CFR 219.27) contain the following management requirements for the National Forest System:

1. Provide that existing significant transportation and utility corridors and other significant rights-of-way that are capable and likely to be needed to accommodate the facility or use from an additional compatible right-of-way be designated as a right-of-way corridor. Subsequent right-of-way grants will, to the extent practicable, and as determined by the responsible line officer, use designated corridors.
2. Ensure that any roads constructed through contracts, permits, or leases are designed according to standards appropriate to the planned uses, considering safety, cost of transportation, and effects upon lands and resources.

Forest Service Manual 2730 provides the following direction:

1. Grant appropriate access across National Forest System lands as promptly as feasible to any party with a right to such access. Forest Officers may grant a right-of-way where a party shows a need and that need is consistent with the planned uses for the Forest. Consider a request for access on its merits within a reasonable time and in a manner consistent with the Secretary's regulations.
2. Unless planned uses of non-Federal land would damage National Forest System lands, do not deny the granting of access because of possible adverse effects on National Forest System land from such activities. When State or local law requires certain approvals for the use or activity requiring access, do not grant rights-of-way until the applicant has obtained those approvals.
3. Requests for access across National Forests may be denied if the private property already has access, or the most feasible access is across non-National Forest land; unless the access cannot be made adequate for the planned use of the land or the applicant has no rights that may be exercised to secure a right-of-way on that location. In considering each case, employ the test of reasonableness in the light of the particular circumstances and planned use of the land. Regulations implementing section 1323(a) of ANILCA will provide more specific criteria as to conditions to be utilized in the granting of access requests.
4. A landowner is entitled to land access in most cases. However, in cases where alternative forms of access have been used successfully for access to lands for similar purposes, consider those access methods in the environmental analysis of the project.
5. Construction of any access facility authorized on National Forest System lands must be on a location and according to plans and specifications that effectively protect the lands and resources. Do not grant an authorization for a lower standard facility that would damage lands or resources in order to make the planned use of the non-Federal land economically feasible or to provide a higher return to the applicant.
6. Do not grant a right-of-way until the provisions of the National Environmental Policy Act (NEPA) have been met.
7. All rights-of-way are subject to existing outstanding rights such as withdrawals for power or reclamation purposes, mineral leases, and valid mining claims.

In Alaska, ANILCA Title XI and Section 1323, provide exceptions and supplemental authorities to general nationwide direction located in the Forest Service Manual System. Regulations have not yet been promulgated for Title XI, ANILCA but will be established soon. Regulations for Section 1323 of ANILCA have been published in the Federal Register in draft format (September 18, 1988, Federal Register, Vol 53, Number 188) and they will soon be finalized.

The Tongass Land Management Plan provides the following goals (USDA Forest Service, 1979, Part 2):

1. Hydroelectric Power - The goal is to facilitate the development of hydroelectric power sites with identified high development potential by managing those sites, and their attendant transmission corridors, in ways which will allow development of these facilities with due consideration of the other various resources.
2. Road Corridors - The goal is to insure that as many as possible of the potential road corridors identified by the Southeast Alaska Multimodal Transportation Study be managed to allow their development with due consideration of the other various resources.

TLMP also provides direction to monitor and evaluate utility lines and other special use facilities to determine when modifications are needed to the (TLMP) Plan (USDA Forest Service, 1979, Part 2).

RESULTS OF TLMP IMPLEMENTATION

The Southeast Alaska Multimodal Transportation Study (Smith and Associates et al., 1979) resulted in two plans which were adopted by the Alaska Department of Transportation and Public Facilities in 1980 and 1986. The 1980 plan contains two principal components: a development plan, and a continuing planning process. The regional transportation development strategy recommended for Southeast Alaska is to improve existing services, with emphasis on the Alaska Marine Highway System, and to continue to evaluate the recommended strategy and various transportation alternatives (USDA Forest Service, 1984, TLMP Evaluation Report, page 85).

Transportation alternatives carried forward in the 1980 plan emphasize airport and ferry terminal improvements, and upgrade of the Prince of Wales Island road system (Alaska Department of Transportation and Public Facilities, 1980, Southeastern Alaska Transportation Plan). Airport and ferry terminals are generally located on non-National Forest System lands. Lands selected by the State under the Alaska Statehood Act or lands eliminated from the Forest through townsite eliminations provide opportunities for these uses. Upgrade of the Prince of Wales road system is discussed above, in the Demand Assessment Section, relative to the Southeast Alaska Corridor Planning Team Study.

The 1986 plan also emphasizes aviation and marine surface transportation. These modes do not require transportation corridors on National Forest System lands. Regarding road transportation, the plan summary (Alaska Department of Transportation and Public Facilities, 1986, Southeast Alaska Transportation Plan, p. iv) states:

> "In terms of road transportation, the short- and long-term focus is on maintaining and upgrading existing road links. While several new inter-community links were evaluated, it was concluded that, under current prospects for traffic growth, these links could be served in a more cost-effective manner by the Marine Highway. It was recommended, however, that the concept of a road up the east side of the Lynn Canal, connecting

Juneau with either Haines or Skagway or both, be periodically re-evaluated, particularly once high-speed ferry service has been introduced."

The Southeast Alaska Corridor Planning Team has identified this connection from Juneau to Haines or Skagway but they identified this link as being more than 20 years into the future (Appendix K).

OPPORTUNITIES AND CONCERNS

Goals of the Tongass Land Management Plan are still appropriate. Proposed Transportation and Utility Systems which are anticipated to be necessary in the future should not be hampered with unnecessarily restrictive management prescriptions. The opportunity exists to work with Alaska Department of Transportation and Public Facilities, Alaska Power Authority, other State and Federal agencies, and private industry, to provide for needed rights-of-way, as public need becomes apparent and transportation and utility routes can be identified.

LAW ENFORCEMENT

OVERVIEW

The USDA Forest Service has the authority and obligation to enforce Federal laws and regulations which affect National Forest lands. In the Alaska Region, law enforcement consists of the prevention, detection, and prosecution of violations of these laws or regulations. Enforcement is carried out by Forest Service Special Agents or Law Enforcement Officers. State or local law enforcement agencies do not have the necessary authority. Cooperative agreements with state and local law enforcement agencies are needed to help fund the extra work created within state and local authorities by National Forest activities.

SUPPLY/INVENTORY

Table 3-59 shows historical numbers and types of law enforcement personnel by Tongass Administrative Areas (LEMARS). Personnel listed are Special Agents and Level IV Law Enforcement Officers (LEO). Additional lower level law enforcement officers have been available to assist, but their primary responsibilities are generally in other areas, leaving varying amounts of time available for law enforcement duties.

TABLE 3-59
LAW ENFORCEMENT OFFICER AVAILABILITY

Fiscal Year	Stikine Area	Chatham Area	Ketchikan Area	Tongass N.F.
1981	No Record	No Record	No Record	1 Agent, 2 inactive LEO
1982	2-30% active LEO	1 Agent, 2 inactive LEO	1 Agent, 1-30% active LEO	2 Agents, .9 LEO
1983	2-30% active LEO	1-75% active LEO, 2 inactive LEO	1 Agent, 1-50% active LEO	1 Agent, 1.85 LEO
1984	2-30% active LEO	1-75% active LEO, 2-25% active LEO	1 Agent, 2-75% active LEO	1 Agent, 3.35 LEO
1985	2-30% active LEO	2-50% active LEO	No Record	1.6 LEO
1986	2-30% active LEO	1-75% active LEO, 1 inactive LEO	1 Agent, 2-50% active LEO	1 Agent, 2.05 LEO
1987	2-30% active LEO	2-50% active LEO	1 Agent, 2-50% active LEO	1 Agent, 2.6 LEO
1988	2-30% active LEO	1-50% active LEO, 1 inactive LEO	1 Agent, 1-30% active LEO	1 Agent, 1.4 LEO
Total Equivalents	4.2	6.25	10.6	21.75

Source: LEMARS Data Base

Percentages show percent of time LEO's were active in law enforcement duties. Remaining time was spent in other duties. Forest summaries are equivalents, based on a total of the percentages.

Table 3.xx shows annual fluctuations of available law enforcement personnel ranging from a low of one Agent in 1981, to a high of one Agent and 3.35 law enforcement officer equivalents in 1984. These data indicate an annual mean of 2.7 available law enforcement personnel for the Tongass National Forest but the data do not indicate any particular trend which would allow projection of anticipated future staffing. Over the eight year period that data are available, staffing has been greatest on the Ketchikan Area and least on the Stikine Area.

DEMAND ASSESSMENT

Law Enforcement demand is reflected by kinds and numbers of offenses reported in LEMARS. These offenses may have resulted in violation notices, warning notices, or incident reports, or they may have been prosecuted under Federal Laws and Regulations. These data may be somewhat misleading since not all offenses were reported and recorded in the LEMARS data base. Table 3-123 displays the data available, by fiscal year and Administrative Area. Offenses are reported as petty offenses, misdemeanors, or felonies.

Petty Offenses are misdemeanors which are punishable by imprisonment for up to six months, a fine of $5,000, or both. The fine may be increased to $10,000 for those other than individual persons (e.g., private corporations or government agencies). Petty Offenses include violations such as occupancy trespass and failure to pay fees at a developed recreation site.

Misdemeanors are any offense other than a felony. They are punishable by imprisonment up to one year and include crimes such as timber theft and theft of property up to $100 in value.

A felony is a more serious crime, punishable by imprisonment exceeding one year or death. Felonies include crimes such as arson and theft of property exceeding $100 in value.

Table 3-60 shows an increase in reported offenses from 1981 to 1984. From 1984 to 1988, data fluctuated annually. Over the eight year period, annual mean offenses reported was 247. The Chatham Area reported the most offenses (more than the other 2 areas combined) and the Stikine Area reported the least. However, the Stikine Area reported more serious offenses (3 misdemeanors and 30 felonies), with the Ketchikan Area second (2 misdemeanors and 21 felonies) and the Chatham Area reporting the fewest number of serious offenses (2 misdemeanors and 2 felonies).

TABLE 3-60
KINDS AND NUMBER OF OFFENSES, BY FISCAL YEAR AND ADMINISTRATIVE AREA

Fiscal Year	Stikine Area	Chatham Area	Ketchikan Area	Tongass N.F.
1981	1 warning	No Record	No Record	1 warning
1982	28 petty 3 misdemeanor 4 felony 35 total	193 petty 1 felony 194 total	37 petty	258 petty 3 misdemeanor 5 felony 266 total
1983	27 petty 5 felony 32 total	204 petty	69 petty	300 petty 5 felony 305 total
1984	37 petty 12 felony 49 total	297 petty	96 petty 9 felony 105 total	430 petty 21 felony 451 total
1985	53 petty 3 felony 56 total	173 petty	No Record	226 petty 3 felony 229 total
1986	59 petty 3 felony 62 total	No Record	182 petty 1 misdemeanor 3 felony 186 total	241 petty 1 misdemeanor 6 felony 248 total
1987	54 petty 1 felony 55 total	111 petty 2 misdemeanor 113 total	No Record	165 petty 2 misdemeanor 1 felony 168 total
1988	112 petty 2 felony 114 total	57 petty 1 felony 58 total	127 petty 1 misdemeanor 8 felony 136 total	296 petty 1 misdemeanor 11 felony 308 total
Total Offenses	404	1,039	533	1,976

Source: LEMARS Data Base

EXISTING DIRECTION

Existing direction is located in Forest Service Manual 5300, the Law Enforcement Handbook, the Alaska Regional Guide, and the Regional Law Enforcement Plan for the Alaska Region. The Regional goal is aimed at preventing crime but takes into account all aspects of law enforcement from prevention to successful prosecution. Regional law enforcement priorities are to: (1) protect human life, (2) protect the property of visitors and employees, and (3) protect property and natural resources under National Forest System management (USDA Forest Service, 1984, Regional Law Enforcement Plan).

The Alaska Regional Guide (USDA Forest Service, 1983) provides the following direction:

1. Through public information programs, explain the impact of vandalism and encourage more positive use of the Forest and more considerate treatment of others.
2. Emphasize cooperative law enforcement activities with Alaska State Troopers in dealing with and correcting violations of State and Federal laws on National Forests. Use trained Forest Officers to assist in enforcing Federal laws and regulations, as appropriate.

RESULTS OF TLMP IMPLEMENTATION

Direction for the law enforcement program is found in the Alaska Regional Guide, rather than TLMP. Public information programs have helped spread the word within Southeast Alaska, since the 1983 Regional Guide, with the objective of reducing vandalism and depreciative behavior within the Tongass National Forest. Local participation in the Woodsy Owl and Smokey Bear programs has increased awareness among school children. As the result of the Marine Litter Campaign and Wilderness Ranger programs 6,400 pounds of litter have been removed from Admiralty Island alone, between 1987 and 1989. The greatest benefit from the Marine Litter Campaign was reported to be in the news media exposure and positive effects to volunteers involved. The Clean Up Juneau Campaign has helped reduce litter in the Juneau Area. Similar programs have been implemented in Sitka and other cities throughout the Tongass. Numerous media contacts have increased awareness about other forms of vandalism since the Regional Guide.

The Regional Special Agent advises of a technical error in Alaska Regional Guide direction in that State law enforcement personnel do not have authority to enforce Federal laws on National Forest System lands (personal communication with James Bailey, USDA Forest Service, Regional Special Agent, Alaska Region, March 24, 1989).

OPPORTUNITIES AND CONCERNS

Information on past staffing indicates the equivalent of only 2.7 Law Enforcement personnel available to protect over 16.8 million acres of National Forest System lands. An annual average of 282 offenses were reported for the Tongass National Forest between 1982 and 1988. The number of offenses reported may underestimate, and not accurately reflect, the number occurring, since lack of available staffing has often resulted in violations remaining undetected or unreported.

MINERALS AND GEOLOGY

INTRODUCTION

The geology and geologic history of the Tongass National Forest is complex. The mountainous eastern boundary of the Forest is composed of metamorphic rocks such as paragneiss, amphibolite, and schist that are thought to have formed hundreds of millions of years ago. These rocks were later intruded by plutonic igneous rocks such as granodiorite and diorite about 60 million years ago (Berg and others, 1978). West of the coast range mountains lies the Alexander Archipelago, whose innermost islands are composed of metamorphic rocks such as hornfels, phyllite, quartz mica schist, and greenstone (Berg and others, 1978; Brew and others, 1984). Sedimentary rocks including limestones, siltstones, sandstones, and conglomerates mixed with volcanic igneous rocks such as andesites and andésitic breccias make up the outermost islands of the Alexander Archipelago (Condon, 1961; Eberlein and others, 1983; Brew and others, 1984). Most of these rocks were deposited from 500 million to 300 million years ago.

Several times during the last 100,000 years, large alpine glaciers flowed west from icefields in the Coast Range mountains, covering all but the highest mountain peaks on the islands of the Alexander Archipelago (Pewe, 1975; Mann, 1986). Glaciers mechanically excavated rock as they advanced, usually following existing river valleys or taking advantage of fractured and weaker rocks along existing fault zones. Many of the glaciers in Southeast Alaska began to melt and recede some 10,000 years ago, revealing a network of islands dissected by numerous streams, U-shaped valleys, and fiords. Wave action has further modified the shorelines of the islands into the intricate patterns of cliffs, wave-cut platforms, spits, and coves we see today.

Fault-bounded assemblages of rocks that have similar geologic histories are called geologic terranes (Gehrels and Saleeby, 1987; Jones and others, 1983) and each terrane has its own distinctive lithology, stratigraphy, structure, and metamorphic history. If a terrane contains occurrences of mineral commodities and shows evidence of a common history of mineralogic genesis, the area may be classified into specific mineral deposit models (Cox and Singer, 1986). Identifying, describing, and understanding geologic terranes and mineral deposit models in Southeast Alaska (Nokleberg and others, 1987) are important to estimating the mineral resources within the Tongass National Forest.

A wide variety of mineral deposit types and mineral resources occur within the boundaries of the Tongass National Forest (Hawley, 1982; Berg, 1984; Nokleberg and others, 1987; USBM, 1989). Examples of some of these mineral resources are gold, silver, molybdenum, uranium, limestone, and barite. The Tongass National Forest also contains nationally-designated strategic and critical minerals such as lead, zinc, copper, tungsten, and platinum group metals. Under provisions of the Strategic and Critical Materials Stock Piling Act of 1979, strategic and critical minerals are defined as those necessary to supply military, industrial, and essential civilian needs during a national defense emergency, and not found or produced in the United States in sufficient quantities to meet emergency needs (USBM, 1983).

Mineral resources are legally divided into three groups; locatable minerals, leasable minerals, and salable minerals. The authority of the Forest Service to influence and regulate the exploration, development, and production phases of mining operations varies with each group. As a result, the Forest Service manages mineral resource programs that are specific to each group of minerals.

LOCATABLE MINERALS OVERVIEW

A locatable mineral is any mineral which is "valuable", in the usual economic sense, or has a property that gives it distinct and special value. Examples of some locatable minerals on the Tongass National Forest are gold, silver, copper, molybdenum, iron, nickel, lead, zinc, and uncommon varieties of limestone and marble.

Every citizen of the United States has a statutory right, granted under the General Mining Law of 1872 as amended, to prospect and explore public domain lands open to mineral entry. The right of access is guaranteed by the Mining Law and is not at the discretion of the Forest Service. Upon discovering a valuable mineral deposit, citizens have the right to locate a mining claim and remove the mineral resources. The citizen holding a mining claim is called the claimant. The claimant is responsible for initiating mining activities and investing the capital required to conduct mineral exploration, site development, mine operation, and reclamation of the site.

Although the majority of Forest lands are presently open to mining claim location, by law, designated Wilderness, National Monuments, and other withdrawn areas are closed to mining claim location. Currently, about 33 percent of the Tongass National Forest is closed or withdrawn from mineral entry. These withdrawn areas, however, are subject to mining claims with valid existing rights established before the date the areas were withdrawn from mineral entry. As a consequence, some mining claims located within existing or proposed withdrawn areas could be developed in the future. Before mining operations in a withdrawn area are approved, a mineral validity examination is conducted for each claim by a certified Forest Service mineral examiner to determine if there are valid existing rights established under the General Mining Law of 1872.

Under a Memorandum of Understanding (May 18,1957) between the Department of Interior, Bureau of Land Management, and the Department of Agriculture, Forest Service, the Forest Service is responsible for the administration of locatable mining activities on National Forest System lands. The Secretary of Agriculture promulgated regulations in 36 CFR 228 to ensure surface resource protection, while encouraging the orderly development of mineral resources on National Forest System lands.

The Forest Service works with claimants to provide reasonable access to their claims, minimize adverse environmental impacts on surface resources, and ensure reasonable reclamation of disturbed lands affected by mining operations. Protection of surface resources is accomplished by reviewing the mining plan of operations submitted by the claimant, disclosing impacts of the proposed mining operations in an environmental document, approving only those activities specified in a plan of operations that are reasonably necessary for the proposed operation, monitoring mining operations to ensure environmental standards specified in the plan of operations are met, and ensuring prompt reclamation of disturbed areas.

SUPPLY/INVENTORY Potential

Southeast Alaska has a long history of mineral prospecting and mining. The first mineral location in Southeast Alaska was recorded in 1867 by a Russian trader near New Kasaan on Prince of Wales Island. In 1880, gold was discovered in placer gravels near Juneau, Alaska. This discovery sparked keen interest and by the turn of the century dozens of mines were in production from the Juneau Mining District to the Ketchikan Mining District. Mining remained quite active until World War II. From the close of World War II to the mid-1970's exploration and mineral production in Southeast Alaska remained low compared to the activity

documented at the beginning of the century. Prospecting and exploration generally increased during the mid-1970's, in part due to the Quartz Hill/Greens Creek discoveries, improved metal prices, and deregulation of gold. Metal prices have continued to improve since the mid-1980's, resulting in increased exploration and renewed interest in precious metals, mainly gold.

The following supply discussion (from USBM, 1985) focuses on 15 locatable minerals found on the Tongass National Forest (USBM, 1989). A few locations where each mineral occurs is presented, but in no way represents a complete listing of mineral occurances or deposits. The minerals are discussed in alphabetical order.

Barite

Barite is a heavy, soft, chemically inert mineral. U.S. consumption of barite is directly tied to the use of weighted muds in oil and gas well drilling, with over 90 percent of demand stemming from those activities. Barite is also used for filler in rubber, paint, plastic, and paper, and is crushed and/or coarse ground for manufacture of barium chemicals and glass. Until recently, the United States was the world's largest producer of barite and is still the number one consumer. Barite deposits occur at Lime Point and Castle Island within the Tongass National Forest.

Cobalt

Cobalt was first used as a pigment about 4,000 years ago when naturally occurring cobalt compounds were used to color glass. Today, cobalt is a important metal, essential in the production of many defense-related items. In its applications, cobalt contributes heat resistance, high strength, wear resistance, and superior magnetic properties. Major uses include jet engine parts, cutting tools, electrical devices, permanent magnets, catalysts, pigments and dryers for paints, and allied products. Cobalt is designated critical and strategic by the US Bureau of Mines (1983) in accordance with the Strategic and Critical Materials Stock Piling Act of 1979. Cobalt deposits occur at Bohemia Basin, Mirror Harbor, and Funter Bay within the Tongass National Forest.

Copper

Used for the last 6,000 years, copper has been one of the most important materials in the development of civilization. Copper was initailly used for tools, weapons, and ornaments. The growth of the copper industry has been intimately linked with the growth in the use of electricity and electrical applications such as motors, generators, power distribution, communications equipment, and household wiring. Copper is also used for roofing, plumbing, household utensils, jewelry, and coins. The United States is the leading consumer of copper products, accounting for 21 percent of world use in 1983. Copper is designated critical and strategic by the US Bureau of Mines (1983) in accordance with the Stretigic and Critical Materials Stock Piling Act of 1979. Copper deposits occur within the Tongass National Forest at the Khayyam and Jumbo deposits on Kasaan peninsula and Funter Bay.

Gold

Gold has been considered a precious metal since ancient times, and the search for gold has stimulated world exploration and world trade for more than 60 centuries. Most of the gold that is fabricated today goes to the manufacture of jewelry. However, because of its superior electrical conductivity and resistance to corrosion, gold has emerged in the late 20th century as an essential industrial metal. Gold performs critical functions in computers, communications equipment, spacecraft, jet aircraft engines, and a host of other products. Gold deposits occur at the Kensington, Jualin, Johnson, Herbert, Chichagoff, Goldstream, and Sea Level deposits within the Tongass National Forest.

Iron	Ornaments of iron have been used for 6,000 years with written references to iron in ancient civilizations in the Middle East, India, and China. Ironmaking was spread through Europe by the Romans, who learned their technology from the Greeks. Ironmaking came into North America during colonial times. In the 20th century higher productivity has been achieved through better refractory linings, higher blast temperatures, humidity control, high top pressure, and fuel and oxygen injection. Steel, an alloy of iron and carbon, is used in large quantities for railroad rails, construction, and ship building. Iron deposits occur at Snettisham, Union Bay, and Mt. Andrews within the Tongass National Forest.
Lead	Lead is a soft, heavy metal, the most corrosion-resistant of the common metals, and one of the oldest metals used by humans. Its major uses are in storage batteries, until recently as an additive in gasoline, and in materials for the construction and metal working industries. Other significant uses include ammunition, color television tubes, protective coatings and paint, electrical cable sheathing, and radiation shielding. Lead is an important strategic and critical metal because both military and civilian activities depend on the stored energy provided by lead-acid batteries. Lead is designated critical and strategic by the US Bureau of Mines (1983) in accordance with the Strategic and Critical Materials Stock Piling Act of 1979. Lead occurs at the Greens Creek, Ground Hog Basin, Homestake, and Texas Creek deposits within the Tongass National Forest.
Molybdenum	Molybdenum is a refractory metallic element used principally as an alloying agent in steels, cast irons, and superalloys to enhance hardenability, strength, toughness, and wear and corrosion resistance. Molybdenum's versatility has assured it a significant role in contemporary technology and industry, which increasingly requires materials that are capable of giving long service under higher stresses, greater temperature ranges, and more corrosive environments. Molybdenum is used as a refractory metal and as catalysts, lubricants, and pigments. Molybdenum has a wide variety of uses, many for which only molybdenum can be used. This has contributed to its rate of growth which is now expected to be greater than other non-ferrous metals. Molybdenum deposits occur at Quartz Hill and Boundary Creek within the Tongass National Forest.
Nickel	Nickel is vital to the iron and steel industry and has played a key role in the development of the chemical and aerospace industries. Nickel's greatest value is in alloys, where it adds strength, and fatigue and corrosion resistance over a wide range of temperatures. The U.S is highly dependent on other countries for its nickel supply. Consumption of nickel has increased as more sophisticated technology has been used to modify existing alloys and develop new ones. Nickel is designated critical and strategic by the US Bureau of Mines (1983) in accordance with the Strategic and Critical Materials Stock Piling Act of 1979. Nickel occurs at the Funter Bay deposit within the Tongass National Forest.
Palladium & Platinum	The platinum group is comprised of six closely related metals: platinum, palladium, rhodium, ruthenium, iridium, and osmium, which commonly occur together in nature and are among the scarcest of the metallic elements. Along with gold and silver, they are known as precious or noble metals. Nearly all of the world's supply of these metals is currently extracted from lode deposits in three countries: the Republic of South Africa, the U.S.S.R., and Canada. The metals are refractory, chemically inert at elevated temperatures to a wide variety of materials, and display excellent catalytic activity. Their principal uses are as catalysts in the automotive, chemical, and petroleum refining industries, and as

corrosion-resistant materials in the chemical, electrical, glass, and dental-medical industries. Palladium and platinum are designated critical and strategic by the US Bureau of Mines (1983) in accordance with the Strategic and Critical Materials Stock Piling Act of 1979. Palladium and platinum occur at the Salt Chuck deposit within the Tongass National Forest.

Rare Earths

The rare-earth elements, sometimes called lanthanides, are a group of 15 chemically similar elements. Although not a lanthanide, yttrium is included with the rare-earth elements because it often occurs with them in nature, having similar chemical properties. The unusual properties of the rare earths are responsible for their use in catalysts, metallurgical processes, magnets, lighting phosphors, glass and optics, electronics, and many other applications. The rare earths are used principally in petroleum cracking catalysts, iron and steel alloying agents, glass additives and polishing compounds, permanent magnets, and phosphors for television and lighting. Rare Earth elements occur in the Bokan Mt. area within the Tongass National Forest.

Silver

Silver is a metal that has been important to societies for thousands of years. Early humans used silver for jewelry, ornaments, and utensils. Silver was also used in trade and as the basis for monetary systems. Discovery of new silver deposits in the 18th and 19th centuries along with increased industrial use of silver led to the elimination of silver as a currency standard. In this century, major industrial uses for silver have developed in photography and electronics. Silver is also used in jewelry, sterling ware, electroplated ware, brazing alloys and solders, and medical and dental applications. Despite silver's wide industrial use, its most important attribute may be the widely held belief that silver, like gold, represents a store of value and indicates wealth. Silver deposits occur at Greens Creek, Lost Zarembo, Poorman, Last Shot, and Homestake within the Tongass National Forest.

Tungsten

The unique, high-temperature properties of tungsten and its alloys are responsible for increased demand for this metal, particularly in the major end-use forms of carbide and pure metal. Current developments that could appreciably influence the future use and supply of tungsten are coated cemented carbides and the recycling of tungsten scrap. Coatings, such as aluminum oxide, titanium carbide, and titanium nitride, have improved the cutting and wear resistance of cemented carbide cutting tool inserts, and use of coatings is expected to increase appreciably during the next few years. Tungsten is designated critical and strategic by the US Bureau of Mines (1983) in accordance with the Strategic and Critical Materials Stock Piling Act of 1979. Tungsten occurs at the 96 and Last Shot deposits within the Tongass National Forest.

Uranium

Prior to 1942, uranium was a by-product associated with primay mining of radium and vanadium. The uranium was used in manufacturing glass and ceramics to produce yellow-brown colors; it was also used in making special alloys of steel, copper, and nickel. Today uranium, a silver-white radioactive metal, is principily used as a fuel for nuclear reactors. In a nuclear reactor, heat is produced by the fission of U-235 which produces steam, drives turbines, and generates electricty. One pound of uranium can produce the equavilent amount of energy of about 14,000 pounds of coal. Uranium is also used in the production of various radioactive isotopes for medical and other applications and for scientific research. Uranium deposits occur at Bokan Mt. within the Tongass National Forest.

Vanadium

The principal use of vanadium is as an alloying element in steel. The addition of small amounts of vanadium, often less than 0.1 percent, to an ordinary carbon steel can significantly increase its strength and improve both its toughness and ductility. Such high-strength, low-alloy steels are attractive for highrise buildings, bridges, pipelines, and automobiles because of their lighter weight. Vanadium-aluminum-titanium alloys are widely utilized in aircraft parts. Vanadium is designated critical and strategic by the US Bureau of Mines (1983) in accordance with the Strategic and Critical Materials Stock Piling Act of 1979. Vanadium deposits occur at Snettisham within the Tongass National Forest.

Zinc

Zinc has been used by humans in alloys for more than 2,000 years and is the fourth most widely used industrial metal, surpassed only by iron, aluminum, and copper. Zinc is used for protective coatings on steel, as diecastings, as an alloying metal with copper to make brass, and in chemical compounds in rubber and paints. Zinc-coated steel is extensively used for agricultural, commercial, and industrial structures, off-road machinery, transmission and communication towers, bridges, ships, and highways. The principal substitutes for zinc are aluminum, magnesium, and plastics. Zinc is designated critical and strategic by the US Bureau of Mines (1983) in accordance with the Strategic and Critical Materials Stock Piling Act of 1979. Zinc occurs at the Greens Creek, Ground Hog Basin, and Homestake deposits within the Tongass National Forest.

SE Alaska Supply

Most estimates of mineral resource potential use a format recognized and developed by the U.S. Bureau of Mines and the U.S. Geological Survey (USBM and USGS, 1980). Mineral resources are divided into identified resources (the primary responsibility of the U.S. Bureau of Mines) and undiscovered resources (the primary responsibility of the the U.S. Geological Survey).

The gross metal value of identified mineral resources were estimated for the Tongass National Forest by the U.S. Bureau of Mines (1989). The emphasis of the report was on critical and strategic minerals and those deposits likely to be developed in the next decade. In this report, the U.S. Bureau of Mines analyzed 171 identified mineral deposits across Southeast Alaska, 148 of which were located within the Tongass National Forest. Each deposit located in the Tongass was assigned to a mineral deposit model (after Berg, 1984), and further grouped into 57 mineral activity tracts. Tonnage and grade were determined for each mineral deposit based on published identified resources or were calculated using statistical tonnage and grade models developed by Cox and Singer (1986). The identified gross metal value was calculated by combining the tonnage and grade figures with an average price from the period 1978-1987 for each commodity.

The total gross in-place metal value of identified mineral resources for Southeast Alaska is estimated to be 1.33 trillion dollars (USBM, 1989). The total gross in-place metal value of identified mineral resources for the Tongass National Forest is estimated to be $43.8 billion dollars. Table 3-61 displays the identified gross metal values, by commodity, for the Tongass National Forest in 1988 dollars.

TABLE 3-61
GROSS METAL VALUES OF IDENTIFIED MINERAL RESOURCES ON THE TONGASS NATIONAL FOREST

Commodity		In Situ Identified Resources		Dollars (1988)
Barite		266,000	tons	10,391,000
Cobalt	*	9,680,000	lbs	64,856,000
Copper	*	452,628,000	lbs	416,418,000
Gold		4,954,000	tr oz	2,261,369,000
Iron		193,045,000	tons	12,711,989,000
Lead	*	484,678,000	lbs	184,178,000
Molybdenum		4,502,646,000	lbs	25,755,135,000
Nickel	*	151,244,000	lbs	431,044,000
Palladium	*	122	oz	17,000
Platinum	*	1,350	oz	680,000
Silver		105,840,800	oz	1,225,636,000
Tungsten	*	425,800	lbs	667,000
Uranium		499,300	lbs	8,313,000
Vanadium	*	7,500,000	lbs	30,750,000
Zinc	*	1,407,428,000	lbs	661,406,000
TOTAL				43,762,849,000

Source: USBM, 1989.

An * denotes commodities that are designated critical or strategic minerals by the U.S. Bureau of Mines (1983).

DEMAND ASSESSMENT

Minerals are used each day by everyone; our culture and society are dependent on their use. Without mining and minerals we would not have modern fishing or logging equipment, airplanes or automobiles, computers, telephones or televisions. The average color television set contains 35 different minerals, from copper to yttrium. All of these minerals must be removed from beneath the surface of the earth using modern mining methods.

The world population currently doubles every 38 years, while the demand for commercial energy and minerals doubles every 24 years. For some minerals, the demand doubles in as little as 12 years (Peters, 1987). If predictions for world-wide demand are correct, the demand for minerals from Federal lands, including the Tongass National Forest, will increase.

SE Alaska Demand

Demand for mineral resources from the Tongass National Forest and Southeast Alaska can be inferred by monitoring exploration activity and by modeling the economics of identified mineral resources.

Exploration

Demand for mineral resources can be inferred based on the amount of money spent by the mining industry to prospect and explore for mineral resources in Southeast Alaska. Increases in the amount of money spent on exploration reflect an increase in demand for mineral resources.

Between 1981 and 1988 the mineral industry spent an average of 7.38 million dollars per year on mineral exploration in Southeast Alaska. In 1988 the mining industry spent 20.64 million dollars on exploration, creating approximately

35,987 person days of work (Green and others, 1989). Table 3-62 illustrates the reported expenditures between 1981 to 1988 for exploration activities in Southeast Alaska (Green and others, 1989). These figures are based on information given to the Alaska State Division of Geological and Geophysical Surveys (DGGS) by private firms and individuals in the mining industry. The DGGS mailed 950 questionnaires on mining activity in Alaska, 245 of which were returned. The figures, therefore, represent reported expenditures only.

TABLE 3-62
REPORTED EXPENDITURES FOR EXPLORATION ACTIVITIES IN SOUTHEAST ALASKA, 1981-1988

Year	Millions of Dollars
1981	20.94
1982	1.52
1983	1.95
1984	2.87
1985	2.53
1986	2.75
1987	5.85
1988	20.64
TOTAL	59.05

Source: Green and others, 1989.

Economic Model

Demand for mineral resources can also be inferred by modeling the economic viability of identified mineral resources. Identified mineral resources with high degrees of economic viability will reflect an increase in demand for those resources by industry.

The economic viability of 148 mineral deposits located within the Tongass National Forest was modeled by the US Bureau of Mines (USBM, 1989). The modeling analysis compared the gross metal value of the identified mineral resources estimated for each deposit with the estimated capitol and operating costs of the mine, mill, and infrastructure required to remove the mineral resources. The US Bureau of Mines model considered location and number of existing claims, mineral occurance, mineral terrane, mineral deposit model, regional and deposit geology, market price projections, mining models to extract minerals, pre-tax net present value (NPV) at 0 percent discounted cash flow rate of return (DCFROR), after-tax NPV at 4% DCFROR, sensitivity to increased metal prices, critical or strategic designation, and current commodity interest by industry.

Fifty seven (57) mineral activity tracts were classified by the US Bureau of Mines as having a high potential for experiencing mineral exploration or development activity during the next 10 to 15 years. The mineral activity tracts were ranked 1, 2 or 3 based upon their anticipated activity level or demand by the mineral industry. A lower ranking reflects a lack of available information, not a lesser potential of mineral occurrence. The rankings are:

Rank 1 Mineral activity tracts mapped with a ranking of 1 would have at least 1 deposit with a positive, after-tax net present value (NPV)

at 4 percent discounted cash flow rate of return (DCFROR) and/or would contain at least 1 active gold deposit.

Rank 2 Mineral activity tracts of ranking 2 would have at least one deposit with a positive pre-tax NPV @ 0% DCFROR and/or contain at least 1 deposit with critical and strategic minerals.

Rank 3 Mineral activity tracts of ranking 3 would have deposit areas with insufficient reserve estimates to perform a reliable NPV economic analysis. It would not contain any deposits with critical or strategic minerals or deposits with positive, after-tax NPV @ 4% or a postiive pre-tax NPV @ 0% DCFROR.

Figure 3-31 displays the location and priority rank of all mineral activity tracts with high development potential on the Tongass National Forest. Table 3-63 displays the acres of the mineral activity tracts by rank. Nearly all of the mapped mineral activity tracts contain one or more deposits. For example, the Juneau Gold Belt contains the Alaska Juneau mine with a NPV of 373,811,000 dollars at 4% DCFROR, the Kensington and Jualin deposits with positive pre-tax NPV at 0% DCFROR, and 26 other deposits which did not show positive NPV. Nevertheless, the entire Juneau Gold Belt tract has a ranking of 1 due to the emphasis given areas likely to have high exploration and development activity in the next 10 to 15 years.

TABLE 3-63
ACRES OF MAPPED MINERAL ACTIVITY TRACTS ON THE TONGASS NATIONAL FOREST

Rank	Acres
Priority 1	497,903
Priority 2	36,156
Priority 3	190,451
Total	724,510

All mineral activity tracts ranked priority 1, 2 or 3 will reflect a higher demand for mineral resources than areas outside the mineral tracts. Those deposits evaluated to have a positive NPV, and the activity tract that deposits are located in, could anticipate higher levels of mining-related activities than deposits currently with a negative NPV. Those deposits with a positive NPV at 0% DCFROR are displayed in table 3-64.

FIGURE 3-31

MINERAL TRACTS WITH HIGH DEVELOPMENT POTENTIAL ON THE TONGASS NATIONAL FOREST

MAP NOT AVAILABLE AT THIS TIME

TABLE 3-64
TONGASS MINERAL DEPOSITS WITH A POSITIVE NET PRESENT VALUE AT 0% DCFROR

Deposit Name	Dollars (1988) in Billions
Bohemia Basin	0.202
Kensington	0.287
Johnson	0.041
Jualin	0.055
Herbert	0.005
Greens Creek	1.398
Chichagoff & Hirst	0.155
Chichagoff Tailings	0.012
Mt. Andrews	0.013
Union Bay	7.077
Goldstream	0.00064
Quartz Hill	17.792
Bokan	0.719
Total	27.758

Source: USBM, 1989.

World Demand

Demand information forcasts for the world and United States are revelent to a discussion of the mineral resources of the Tongass National Forest because world economic markets affect mineral demand in Southeast Alaska.

The following demand discussion estimates, for 15 locatable minerals, the mineral reserves of the United States and the world, if those reserves will meet future demand, and estimates the expected demand for the United States and the world in the year 2000 (from USBM, 1985; Minerals Information Service, 1989; Energy Information Administration, 1988a and 1988b).

Demand projections use a computerized analysis system which performs a statistical regression analysis based on the historical data of each mineral commodity's end-use consumption. The regression analysis produces historical relationships between consumption and macro-economic variables such as U.S. Gross National Product, population, and indexes of U.S. industrial production activity. Each mineral is found on the Tongass National Forest (USBM, 1989); the discussion is arranged in alphabetical order.

Barite

U.S. barite demand more than tripled during the decade ending in 1981 because of increased oil and gas well drilling, but it has since decreased. The U.S. record high of 4.7 million tons in 1981 had decreased to 2.7 million tons by 1983. The future of the barite market in the United States depends on oil and gas well drilling activity. Domestic barite demand is expected to increase slowly at an annual average rate of about 1.3 percent through 1990 and then accelerate at an average rate of 3.4 percent to 2000. Therefore, the domestic demand for barite will double in 21 years, or by the year 2010, given an annual growth rate of 3.4 percent. By the year 2000, the projected cumulative demand will be 60 million tons, therefore the U.S. reserves of 30 million tons are not adequate. The cumulative world demand of 146 million tons for 1983-2000 approximates reserves of 185 million tons; however, the existing estimated barite world reserve base is 500 million tons.

Cobalt

The United States utilizes one-third of the world's cobalt production. Although domestic reserves are relatively large, no cobalt has been produced in the U.S. since 1971. Production from low grade domestic reserves has not been economically feasible. The most probable domestic demand for the year 2000 is 34 million pounds compared with 15.7 million pounds used in 1983. This represents an average annual growth rate of 3.9 percent. Therefore, the domestic demand for cobalt will double in 18 years, or by the year 2007, given an annual growth rate of 3.9 percent. Rest-of-world demand for the year 2000 is forecast to range from 50 to 75 million pounds compared to about 31.5 million pounds in 1983.

Copper

The United States is the leading consumer of copper products, accounting for 21 percent of world use in 1983. In recent years, the principal problems affecting the world's copper industry have been a persistent oversupply of copper leading to world overproduction, coupled with weak demand. It is estimated that in 1989 the U.S. consumption of copper will be 2.3 million tons and the domestic mine production will be 1.5 million tons. The domestic demand for copper in the year 2000 is expected to be 2.8 million metric tons, equivalent to an average annual growth rate of 1.9 percent per year from 1983 to 2000. Therefore, the domestic demand for copper will double in 38 years, or by the year 2027, given an annual growth rate of 1.9 percent. The domestic demand in 2000 could be as high as 3.5 million metric tons or as low as 2.4 million metric tons. Demand growth is expected to be better for the rest of the world. The probable forecast demand for copper in the rest of the world is 15.0 million metric tons, with an average world growth rate of about 2.7 percent per year. Therefore, the world demand for copper will double in 27 years, or by the year 2016, given an annual growth rate of 2.7 percent.

Gold

More than one-third of all gold that has been mined in the world is still in government vaults because gold was considered a monetary metal. In 1968, the major industrial nations agreed not to acquire newly mined gold. Since then, the metal has become a free market commodity and prices have been allowed to move in response to supply and demand. The ban on private ownership of gold by United States citizens begun in 1934 was rescinded in 1975. Since then, the U.S. gold market has grown rapidly. The world's leading gold-producing nations, in descending order are: the Republic of South Africa, the U.S.S.R., Canada, the United States, China, and Brazil. The United States produces between 3 and 4 million ounces annually from mining and the reclamation of scrap. Jewelry is expected to remain the dominant use the remainder of this century. U.S. demand by the year 2000 is forecast to be about 6.7 million ounces at an average growth rate of 2.4 percent with world demand forecast to be 49.3 million ounces. Therefore, the U.S. demand for gold will double in 30 years, or by the year 2019, given an annual growth rate of 2.4 percent. World resources are adequate to meet the forecast demand.

Iron

During the remainder of the century, growth in the demand for iron and steel in the industrialized countries is expected to be slow compared to that in the 1950's and 1960's. Factors causing the lower growth include a shift of the industrialized economies toward services and manufacturing industries that use little iron or steel, more efficient use of materials in manufacturing and construction, substitution of other materials for iron and steel, and imports of manufactured products from forien countries. The United States is expected to retain the capacity to supply its own steel needs. The estimated 1989 domestic production of iron ore will be 56 million tons; the probable U.S. consumption will be 73 million tons.

Lead	The U.S. has the world's largest reserves of lead, currently over one-fifth of the world's total; it is also the world's most efficient recycler. Australia, Canada, and the U.S.S.R. also have significant resources, and in 1983, these countries together with the U.S. accounted for almost one-half of the world's total mine production. The U.S. is the world's largest producer and consumer of lead, currently producing about one-fifth of the total world's supply. Seventy-five percent of its ultimate domestic use is in transportation, in applications that make it less susceptible to economic recession than most other metals. Based on assumptions made for end uses, forecast for U.S. annual lead demand by the year 2000, ranges from 1.1 to 2.2 million metric tons, with an average of 1.6 million metric tons, and a probable annual growth rate of 1.3 percent. Therefore, the U.S. demand for lead will double in 55 years, or by the year 2044, given an annual growth rate of 1.3 percent.
Molybdenum	Molybdenum reserves and productive capacity are concentrated in a few countries. World mine output was an estimated 138 million pounds in 1983, with the U.S., Canada, and Chile providing 65 percent of that output. An estimated 17 percent of the world's output came from the U.S.S.R. These four countries, led by the U.S., are expected to continue as the principal mine producers for the rest of this century. The same four countries have about 85 percent of the estimated 25 billion pounds of the world reserve base of molybdenum. The U.S. has exported about half of its mine output in recent years, and currently supplies about 45 percent of the molybdenum consumed in other countries. Based on assumptions for various end uses, U.S. demand for molybdenum in 2000 is forecast at 71 million pounds, corresponding to an annual growth rate from 1983 of 0.8 percent. Therefore, the U.S. demand for molybdenum will double in 90 years, or by the year 2079, given an annual growth rate of 0.8 percent. Rest-of-world demand for molybdenum was estimated at 109 million pounds in 1983 and is forecast to be 190 million pounds in 2000.
Nickel	The U.S is highly dependent on other countries for its nickel supply. Although there is only one nickel mine in the U.S., there are large resources in the U.S. that could be used if technological and environmental problems were resolved. U.S. demand for primary nickel by the year 2000 has been forecast to rise to 270,000 tons annually. The principal end uses of nickel in 2000 are expected to be in the chemical and petroleum, electrical, construction, and aircraft industries--little changed from 1983. Nickel demand by the rest of the world by 2000 has been forecast to be 1 million tons, a 3.1 percent annual increase. Therefore, world demand for nickel will double in 23 years, or by the year 2012, given an annual growth rate of 3.1 percent.
Palladium & Platinum	Over 95 percent of the platinum-group metals (PGM) consumed in the United States each year is by industry. Of the annual U.S. supply of PGM, about 7 percent is secondary metal, recycled or reclaimed mainly from domestic sources; and 93 percent is primary, or newly mined, metal, virtually all of which is imported. U.S. production of PGM is a byproduct of copper production. Domestic reserves are small, but resources are large, especially in the U.S.S.R. and the Republic of South Africa. Domestic demand for PGM is expected to increase from 1.9 million ounces in 1983 to about 2.9 million ounces by the year 2000, a 2.5 percent annual increase. Therefore, the domestic demand for PGM will double in 29 years, or by the year 2017, given an annual growth rate of 2.5 percent.
Rare Earths	The U.S. was among the world's leading producers, processors, and consumers of the rare earths in 1983. The rate of domestic demand depends on trends in

several industries, including petroleum refining, permanent magnet electric motor, electronic component, glass, phosphor, and iron and steel. At current rates of demand, world resources of the rare-earth elements are large and ample for several hundred years. Using 1983 as the base year, domestic demand for rare-earth elements and yttrium is expected to grow at an average rate of 3.1 percent per year to 2000. Therefore, domestic demand for rare earths will double in 23 years, or by the year 2012, given an annual growth rate of 3.1 percent. Demand for rare-earth elements and yttrium in the rest of the world through the year 2000 is expected to increase at a slightly lower rate than in the U.S.

Silver

Silver was mined in 57 countries in 1983 with Mexico, Peru, the U.S.S.R., the U.S., Canada, and Australia as the largest producing nations. U.S. mine production has increased since the historically high prices of 1979-80, averaging over 41 million ounces per year between 1981-83. Domestic consumption has declined from a peak of 197 million ounces in 1973 to 118 million ounces in 1983. The probable demand for silver in the U.S. in the year 2000 is 150 million ounces, an annual increase less than 1 percent. Therefore, the domestic demand for silver will double in about 75 years, or by the year 2064, given an annual growth rate less than 1.0 percent. U.S. silver reserves are less than the probable cumulative U.S. demand to the year 2000; but, world reserves are estimated to be adequate to meet the cumulative demand for the U.S. and the rest of the world. The U.S. will probably continue to rely on imports as an important component of its supply.

Tungsten

U.S. mine production in 1983 was 980 tons or about 20 percent of their capacity. Current developments that could appreciably influence the future use and supply of tungsten are coated cemented carbides and the recycling of tungsten scrap. Coatings, such as aluminum oxide, titanium carbide, and titanium nitride, have improved the cutting and wear resistance of cemented carbide cutting tool inserts, and use of coatings is expected to increase appreciably during the next few years. Demand for primary tungsten in the U.S. in 2000 is expected to be about 14,000 tons, corresponding to a 9.2 percent annual growth rate. Therefore, the domestic demand for tungsten will double in 8 years, or by the year 1997, given an annual growth rate of 9.2 percent. Demand in the rest of the world for primary tungsten in 2000 is forecast at 45,000 tons, equivalent to a 1.6 percent annual growth rate. Therefore, world demand for tungsten will double in 38 years, or by the year 2027, given an annual growth rate of 1.9 percent.

Uranium

The uranium industry reported domestic economic uranium reserves of 369.2 million pounds at the end of 1988, spending 20.1 million dollars on exploration and development. Domestic uranium mines produced 9.5 million pounds using underground, open pit, and insitu mining methods, this excludes uranium recovered as a byproduct of the mining of other minerals. Imports of uranium totaled 15.8 million pounds in 1988 and exports increased to 3.3 million pounds in 1988 from 1.0 million pounds in 1987. In 1988, uranium requirements are projected to range from 36.9 million to 39.8 million pounds. Demand projections for the year 2020 range from 17.1 million pounds, a decline of 46 percent from 1988 requirements to 75.0 million pounds of uranium, an annual growth rate of 2.0 percent.

Vanadium

Vanadium is usually produced as a byproduct or coproduct of other elements, such as iron, uranium, or phosphorus. At present projected consumption rates, world reserves of vanadium should last far beyond the year 2000. The Republic of South Africa is the world's largest supplier of vanadium ores and slags. The U.S.S.R., U.S., China, and Finland are other major producers. U.S. demand for vanadium plummeted from a record high of 10,200 tons in 1979 to only 3,300 tons in 1983.

However, the demand is expected to recover and reach 14,000 tons by the year 2000, an annual growth rate of 8.9 percent. Therefore, the U.S. demand for vanadium will double in 8 years, or by the year 1997, given an annual growth rate of 8.9 percent. Demand by the rest of the world may increase about 4.4 percent per year, with total world demand reaching 74,000 tons in 2000. Therefore, the world demand for vanadium will double in 16 years, or by the year 2005, given an annual growth rate of 4.4 percent.

Zinc

Zinc ore was mined in 50 countries in 1983 with the U.S. as the fifth leading producer. The U.S. is a major consumer of zinc, using about one-sixth of the total world supply in 1983, although it produced only 5 percent of world mine output in that year. U.S. demand for zinc fell substantially in the last decade, and by 2000, may not exceed the high demand of 1.5 million tons established in 1973 unless new uses for zinc such as in electrical utility load-leveling batteries become important. The most probable domestic demand for zinc in the year 2000 is 1.4 million tons which represents an average annual growth rate of 1.8 percent. Therefore, the domestic demand for zinc will double in 40 years, or by the year 2029, given an annual growth rate of 1.8 percent. The demand for the rest of the world was forecast to be 8.0 million tons, representing an average annual growth rate of 1.9 percent. Therefore, the demand for zinc will double in 38 years, or by the year 2027, given an annual growth rate of 1.9 percent.

LEASABLE MINERALS OVERVIEW

Federally owned leasable minerals include oil, gas, coal, geothermal resources, potassium, sodium, phosphates, and sulfur. These minerals are subject to exploration and development under leases, permits, or licenses under the Mineral Leasing Act of 1920, as amended, the Mineral Leasing Act for Acquired Lands of 1947, the Geothermal Steam Act of 1970, and the Federal Onshore Oil and Gas Leasing Reform Act of 1987. The authority to manage these minerals is presently administered by the U.S. Department of Interior, Bureau of Land Management in cooperation with the Forest Service.

On National Forest System lands open to leasing, the Bureau of Land Management requests Forest Service concurrence in their leasing process. The Forest Service recommends environmental stipulations to protect surface resources; these stipulations are then attached to the lease. Environmental protection measures and stipulations are developed based on environmental analysis (as documented in an environmental assessment or environmental impact statement), and on the management objectives adopted for the land upon which an application has been received.

SUPPLY/INVENTORY
Potential

Oil and gas. The resource potential for oil and gas is considered to be moderate to low in the Yakutat region and low in the Sea Otter Sound area of Prince of Wales Island (USBM and Hawley, 1978).

Coal. Coal-bearing rocks occur near Icy and Yakutat Bays, Murder Cove at the southern tip of Admiralty Island, Kasaan Bay on Prince of Wales Island, Hamilton Bay on Kupreanof Island, and Port Camden on Kuiu Island. These coal occurrences are classified as lignite, of small extent, and apparently of little commercial value (Buddington and Chapin, 1929).

Geothermal. Geothermal resources occur in 19 known locations in Southeast Alaska (Liss, Motyka, and Nye, 1989). Geothermal waters have been used for small scale space heating, bathing, and growing vegetables at the Baranof and Tenakee sites (USBM and Hawley, 1978). Large-scale commercial geothermal development is not

anticipated. Geothermal resource sites in SE Alaska (from (Liss, Motyka, and Nye, 1989) are displayed in table 3-65.

TABLE 3-65
GEOTHERMAL RESOURCE SITES IN SOUTHEAST ALASKA

Chatham Area	Ketchikan Area	Stikine Area
White Sulfur	Baker Island	Twin Lakes
Neka Bay	Bailey Bay	Mt. Rynda
Tenakee Inlet	Bell Island	Chief Shakes
North Peril Strait		Barnes Lake
Tenakee		Bradfield Canal
Tenakee Wells		
Nylen		
Fish Bay		
Goddard		
Baranof		
Edgecumbe		

Potassium, sodium, phosphates, and sulfur. Potassium, sodium, phosphates, and sulfur do not occur on the Tongass National Forest because the geologic and mineral terranes in Southeast Alaska do not support the formation and genesis of these minerals.

DEMAND ASSESSMENT

Presently there are no leasable mineral applications or pending applications, prospecting permits, or geophysical exploration permits on the Forest. No leasable mineral commodities are presently being produced on the Tongass National Forest. The anticipated demand for leasable minerals on the Tongass National Forest is expected to be low.

SALABLE MINERALS OVERVIEW

Salable, or "common variety," minerals are defined by the Materials Act of 1947 and Public Law 167 of 1955. These minerals are sold rather than located or leased. In general, they occur widely and have a low unit value. Salable minerals include petrified wood and common varieties of sand, stone, gravel, pumice, clay, and other similar materials. Such common variety mineral materials include deposits which, although they have economic value, are used for agriculture supply and animal husbandry, building materials, cleaning and abrasive materials, construction, decorative and ornamental arts, and landscaping. Their sale is totally at the discretion of the Forest Service and regulated by 36 CFR 228.

SUPPLY/INVENTORY
Potential

Locating and developing a mineral materials source is controlled by the quality and quantity of rock, overburden depth, site sideslope, geographic location relative to population centers, road construction for timber sale activities, and availability of funding. There is an adequate supply of rock sources with suitable quality (hardness and durability) on the Ketchikan Area. Rock quality is poor on the Chatham and Stikine Areas and material sources are difficult to locate. Sand and gravel sources are scarce throughout the Forest except on the Yakutat Ranger District.

All roads built on the Tongass National Forest require rock to construct because the subgrade soils have poor strength characteristics. Between 1977 and 1988

approximately 3 percent of the miles constructed were arterial roads, 7 percent collectors, and 90 percent local, averaging 15,000 cubic yards per mile, 13,500 cubic yards per mile, and 12,500 cubic yards per mile, respectively, to construct. The total in-service use of rock between 1977 and 1988 was 20,517,208.5 cubic yards, used to construct 1,627.3 miles of road. This figure does not include reconstruction, temporary roads, log transfer facilities, and log sort yards. Table 3-66 illustrates the total number of cubic yards of rock used to build timber sale roads between fiscal year 1977 and 1988.

TABLE 3-66
CUBIC YARDS OF ROCK USED FOR ROAD CONSTRUCTION, FY 1977-1988

	Cubic Yards			
Year	Chatham Area	Ketchikan Area	Stikine Area	Tongass NF Total
1977				1,954,917.0
1978				4,518,058.5
1979				2,233,107.0
1980				746,055.0
1981				1,665,346.5
1982				2,773,048.5
1983				1,320,138.0
1984				931,936.5
1985				754,906.5
1986	118,863.0	656,275.5	639,837.0	1,414,975.5
1987	150,475.5	620,869.5	117,030.0	888,375.0
1988	309,802.5	542,470.5	464,071.5	1,316,344.5
TOTALS	579,141.0	1,819,615.5	1,220,938.5	20,517,208.5

Note: Cubic yard figures for the areas from 1977 to 1985 are not available.

DEMAND ASSESSMENT

The dominant market for mineral materials is in support of the Tongass National Forest transportation program. The current cubic-yard demands for arterial, collector and local roads are expected to continue. The demand for rock will closely follow the need to construct new timber sale roads.

As the use of Forest roads increases, and both the Alaska State Department of Transportation, and the Federal Highways Department, assume responsibility for road maintenance, the demand for crushed aggregate will increase. It will be expensive to locate crushed rock sites with suitable quality and quantity in the northern part of the Forest. Haul distances will increase. As land exchanges continue, new communities and existing communities will require mineral materials for development of roads, and for foundations for homes, schools and other buildings. The demand for Forest Service rock in support of these growing communities will increase.

EXISTING DIRECTION

Forest Service Manual 2800, and the Alaska Regional Guide (USDA Forest Service, 1983), provide the following direction for mineral activities:

1. Encourage the exploration, development, and extraction of mineral and energy resources. Give priority to proposals that relate to the development of energy and strategic and critical minerals.

2. Ensure the integration of mineral resource programs and activities with the planning and management of renewable resources through the land and resource management planning process (FSM 1922), recognizing that mineral development can occur concurrently or sequentially with other resource uses.

3. Plan and provide for access to, and occupancy of, National Forest System lands for mineral resource activities, consistent with the overall management objectives and the rights granted through statutes, leases, licenses, and permits. Eliminate or prevent occupancy that is not reasonably incident to, and required for, the mineral operation.

4. Prior to applying for the administrative withdrawal of National Forest System lands from mineral entry, ensure the consideration of a) the national interest in strategic and critical minerals, b) the value of the mineral resource foregone, and c) the value of the resource or improvement being protected (FSM 2760). Ensure that valid existing rights have been established before allowing mineral or energy activities in congressionally designated or other withdrawn areas.

5. Coordinate and cooperate with other Federal and State agencies having authority and expertise in mineral-related activities.

6. Maintain an effective professional, technical, and managerial work force that is knowledgable in mineral exploration and development.

7. Process mineral applications, operating plans, leases, licenses, permits, other use authorizations, and NEPA environmental analyses in an efficient and timely manner.

8. For all mineral exploration and development proposals that would create environmental disturbance, require a reclamation plan to return the land to other productive uses consistent with land and mineral management goals. Bonds will be required in all cases where significant surface disturbance is anticipated, to ensure that adequate reclamation measures are provided.

9. Mineral material permits will be granted for extraction of sand, gravel, and rock when such resources are not reasonably available on private lands, when it is consistent with the land-use plan, and when adequate environmental protection measures can be taken.

10. Where the opportunity exists, and in cooperation with the Alaska Department of Fish and Game, borrow pits will be designed and excavated to facilitate their conversion into salmon rearing ponds.

The following is existing geologic resources direction taken from Forest Service 2880 Manual and the Alaska Regional Guide (USDA Forest Service, 1983):

1. Forest Service land and resource management plans and projects shall consider geologic factors.

2. Geologic information shall be gathered, evaluated, and used as an integral part of administering National Forest lands and resources.

3. Guidelines and standards for the acquisition and reporting of geologic information will be established to meet the specific needs of Forest Service programs.

4. Geologic landform types should be represented in the National Forest research natural areas, special areas, and experimental forests in Southeast Alaska.

RESULTS OF TLMP IMPLEMENTATION

The TLMP Evaluation Report (USDA Forest Service, 1984) gives the following findings:

"Much of the original issue centered on concerns about prospective Wilderness designations on the Tongass and the uncertainty of which areas would ultimately be designated. The 14 Wildernesses created under ANILCA have clarified this situation. Special management provisions and wilderness boundary adjustments for major mining development (such as Noranda and US Borax) were also included in ANILCA."

"Land availability for exploratory purposes continues to be a major concern of the minerals industry, however, since the 14 Wilderness areas encompass a significant portion of the potentially valuable mineralized lands within the Tongass."

"Minerals development activity has been slower than originally projected in TLMP, primarily due to depressed mineral markets. As noted in the Alaska Regional Guide, applicable laws and regulations will continue to govern mineral activity. ANILCA has reiterated the access rights of existing claim holders and prospectors. However, due to a provision of the 1964 Wilderness Act, the 14 Wilderness areas have been closed to new mineral entry since January 1, 1984."

OPPORTUNITIES

The U.S Geological Survey is currently studying the undiscovered mineral resources of the Tongass National Forest, however, information from this study is not yet available. Opportunity exists to include the undiscovered locatable mineral resources in the Tongass Land Management Plan and EIS.

Willingness-to-pay values for mineral exploration would be very useful in estimating the potential future demand for mineral resources, the future demand for access, and areas requiring access. This information could better portray data for future planning documents of areas likely to see mineral activities. The opportunity to cooperatively develop these values in a shared partnership with the State of Alaska and other Federal Agencies could be explored.

An inventory of geologic resources would offer opportunity to provide interpretive data for recreation displays, determine geologic criteria in support of areas suitable for Research Natural Areas, Special Areas, and Experimential Forests, and aid in the location of rock sources and identification on slope stability and other geologic hazards. This resource inventory could include caves, groundwater, rock, sand and gravel, and areas of special or unique geologic characteristics.

An inventory of leasable minerals, existing potential, and future demand of each mineral would provide the opportunity to address these minerals in detail in planning and environmental documents.

The opportunity exists to develop partnerships with private mining companies and the U.S. Bureau of Mines in providing local training and education to District and Supervisors Office mineral administrators.

There is an opportunity to design gravel sources for eventual use as fish rearing and spawning locations.

An opportunity exists to develop a partnership, to showcase the mining history of the Tongass National Forest, with the Alaska State Museum, the AJ Museum in Juneau, the Alaska Miners Association, and the U.S. Bureau of Mines.

Minerals development can be coordinated concurrently and sequentially with other resource uses in an environmentaly sound manner. Opportunities exist to develop a partnership to showcase multiple-use management with the Julain, Kensington, and/or Greens Creek projects.

MORATORIUM AREAS

OVERVIEW

House of Representatives Bill 987 (H.R. 987) would designate 23 areas on the Tongass as Wilderness. These 23 areas, which total 1,885,340 acres, are referred to as "moratorium areas" in Sec. 201 of H.R. 987.

Various groupings of portions of these 23 areas and adjacent lands have been identified by interest groups in their proposals for management of the Tongass (see table 3-67). The Southeast Conference policy statement, endorsed by the Governor of Alaska, calls for 12 areas to "remain in a roadless condition." Eleven of the 12 areas are the same as, or smaller portions of, the 23 moratorium areas in H.R. 987. A portion of one area surrounding Lisianski Inlet on Chichagof Island is not included in H.R. 987. The Alaska Loggers Association policy statement identifies 6 of the 23 areas "for removal from multiple use management". Since these 23 areas are being considered in proposed legislation, and form the basis for alternate management proposals being forwarded by interest groups, they will receive consideration in alternatives for the Forest Plan Revision. This section summarizes the resources and management opportunities of each of the 23 areas.

Appendix A includes further background on current pending legislation.

Table 3-67 summarizes the support of various groups for Wilderness designation or other protective management of the 23 areas, and includes the total acreage, forested and non-forested character, and tentatively suitable timber acreage.

SUPPLY/INVENTORY
Existing

All 23 moratorium areas are included within "roadless areas" being evaluated in the Tongass Plan Revision. As such, they meet the minimum requirements of the Wilderness Act of 1964 and the criteria established for the 1979 Forest Service Roadless Area Review and Evaluation (RARE II); that is, they represent areas of undeveloped land which have outstanding opportunities for solitude and primitive recreation, contain at least 5,000 acres (or are of sufficient size to make preservation and use in an unimpaired condition practical), and may contain ecological, geological, or other features of scientific, educational, scenic or historic value.

Comprising 11 percent of the Tongass National Forest and 17 percent of the currently roadless area on the Tongass, the moratorium areas range in size from 3,900 acres on Sullivan Island to 352,200 acres surrounding Upper Hoonah Sound and Lisianski Inlet on Chichagof Island. Of the 23 moratorium areas, eight are adjacent to existing Wilderness (see Appendix C).

Current Situation

As presently mapped for H.R. 987, portions of four of the moratorium areas, Rocky Pass, West Duncan Canal, Calder/Holbrook and Sarkar Lake, totaling about 11,000 acres, have been roaded and/or harvested in the past 50 years. Many of the harvested areas included in the moratorium areas are located in bays and beach fringes that were harvested without the construction of roads.

TABLE 3-67
Support for and Characteristics of the 23 "Moratorium Areas"

(All figures are in acres.)

Area		Nat. Forest Lands	HR987	SEC	ALA	SEACC	Forested	Non-Forest	Tentatively Suitable
Yakutat Forelands	*	218,560	W	P	U	P	109,145	109,600	48,732
Berners Bay		45,954	W	P		W	23,837	22,137	9,044
Young Lake		18,482	W	P		W	13,777	4,706	7,889
Chichagof (Lisianski, Goose)	*	352,225	W	P	U	W	221,486	130,830	72,568
Kadashan		33,861	W	P	U	W	30,003	3,987	13,493
Trap Bay		6,555	W	P		W	5,296	1,259	3,158
Chuck River	*	123,540	W	P	U	W	101,000	23,540	61,572
South Kuiu		191,141	W			W	180,816	10,384	92,679
Rocky Pass		75,938	W			W	72,846	3,671	27,543
West Duncan Canal		133,734	W			W	118,824	14,969	37,108
South Etolin Island		83,170	W			W	74,311	9,310	27,516
Naha		31,830	W			W	28,331	3,519	16,075
Calder/Holbrook	*	68,705	W	P		W	61,839	6,865	40,643
Sarkar Lake		50,875	W			W	45,479	5,395	24,455
Outside Islands		97,259	W	P		W	94,094	3,346	42,261
Karta River		39,688	W	P	U	W	34,270	5,698	21,494
Nutkwa	*	52,576	W	P	U	W	49,455	3,960	28,070
Kegan Lake		24,540	W			W	19,913	4,988	9,175
Anan Creek		38,473	W			W	33,552	4,982	8,343
Point Adolphus/Mud Bay		73,394	W			W	49,590	23,964	22,621
Pleasant/Lemesurier Is.		23,096	W			W	21,917	1,260	9,318
Sullivan Island		3,984	W			W	3,944	40	2,021
Port Houghton/Sanborn		58,891	W			W	45,371	13,091	25,096
TOTAL FOR ALL AREAS		1,885,340					1,468,150	417,190	650,875

W - 23 areas proposed as Congressionally designated Wilderness. Southeast Alaska Conservation Council (SEACC) supports all H.R.987 areas as Wilderness except the Yakutat Forelands, which it proposes as protected for fish, wildlife and subsistence use.

P - 12 areas to be "protected" with no timber harvest, according to the Southeast Conference (SEC). (Two of the 12 SEC areas, Lisianski River and Goose Flats, are included partly within the H.R.987 area known as Chichagof.)

U - 6 areas to be "unavailable for multiple use", according to the Alaska Loggers Association (ALA).

* - Actual area or boundaries differ significantly even though similar names are used.

The moratorium areas contain 650,875 acres of tentatively suitable forest lands, or about 22 percent of the tentatively suitable forest lands on the Tongass. Five of the moratorium areas (Calder/Holbrook, Sarkar Lakes, Outside Islands, Nutkwa, and Kegan Lake) which have a total of 144,604 acres of tentatively suitable forest lands, are located within the primary sale area for the Ketchikan Pulp Company (KPC) Long-term Sale. Six areas (Chichagof, Kadashan, Trap Bay, Point Adolphus/Mud Bay, South Kuiu and a portion of Rocky Pass) with 218,290 acres of suitable forest lands are within the primary sale area of the Alaska Pulp Corporation (APC) Long-term sale. The total annual sale quantity (ASQ) on the 23 moratorium areas combined is approximately 91 million board feet with 157,304 acres of suitable forest lands being included in the APC 1986-90 and the KPC 1989-94 operating plans.

Compared to the existing 14 Wildernesses on the Tongass, the moratorium areas in general tend to represent lower elevation sites with less alpine, rock and ice and more forested lands and islands. Geographically, the 23 areas are widely distributed throughout the non-Wilderness portion of the Forest.

MORATORIUM AREA DESCRIPTIONS

The 23 moratorium areas are described briefly below:

Yakutat Forelands

(A portion of Roadless Area 339 - Yakutat Forelands - see Appendix C.) This 218,560 acre area includes the low-elevation glacial outwash plain along the Gulf of Alaska extending from the Dangerous River to the boundary of Glacier Bay National Park and Preserve along the Alsek River and Dry Bay, 25 miles east of the community of Yakutat. The extensive sandy beach fringe and the shores of the Alsek at Dry Bay have numerous developments and long established patterns of motorized use and access for hunting and traditional fishing use. There are several airstrips in the area. The area adjoins the Russell Fiord Wilderness. Residents of the mostly native community of Yakutat (population 600) generally appear to desire some form of management that would emphasize maintenance of fish and wildlife habitat and retain the opportunity for traditional access and use. (The Southeast Conference proposal referred to as Yakutat Forelands excludes LUD 2 lands, Dry Bay, and the Pacific beaches contained in H.R. 987.)

Berners Bay

(Portions of Roadless Areas 301 and 305 - Skagway-Juneau and Juneau Urban - see Appendix C.) This 45,954 acre area includes the lower valleys of the Berners, Lace and Gilkey Rivers on the east side of the Lynn Canal, about 40 miles north of Juneau, and about five miles from the terminus of the Juneau road system. The area has important fishery values, and is used for hunting and viewing brown bear, moose, and mountain goat. It is immediately adjacent to two significant mineralized areas (the Jualin complex of patented claims, and the Kensington complex) both of which have approved operating plans for access roads and exploration. The moratorium area includes potential road corridors to Berners Bay and for a proposed road to Haines. Recreation use of the Berner's Bay Moratorium Area is currently high. The area also contains several permitted recreation cabins.

Young Lake

(A portion of Roadless Area 307 - Green's Creek - see Appendix C.) This 18,482 acre area occupies the drainage of Admiralty Creek on the north end of Admiralty Island, and includes Young Lake and Admiralty Cove. These popular recreation destinations are the site of three public recreation cabins and a trail managed by the Forest Service. The Young Lake moratorium area is popular for fishing and deer hunting, and supports abundant brown bear. It is adjacent to a large silver mining operation at Green's Creek.

Chichagof

(A portion of Roadless Area 311 - Chichagof - see Appendix C.) This area includes 352,225 acres on Chichagof Island, including upper Hoonah Sound and the Lisianski River. (Other proposals for Wilderness in this area use the names Lisianski River, Goose Creek, and Lisianski-Upper Hoonah Sound and differ in both boundaries and size.) Part of the area adjoins the West Chichagof-Yakobi Wilderness. Many streams and rivers in this moratorium area have very high value fishery habitat which contributes significantly to northern Southeast Alaska commercial and subsistence fisheries, and supports an important recreational and commercial charter boat industry. High value wildlife habitat is found throughout the area, and both deer and brown bear sport hunting are important uses. Subsistence activities occur in the area. The Chichagof Roadless Area has mineralization of potential value in 19 locations and includes several proposed road corridors related to the Alaska Pulp Company Operating Plan for 1986-1990. (The Southeast Conference proposal includes portions of Lisianski Inlet not included in H.R. 987. A separate Southeast Conference area known as Goose Flats is included within the H.R. 987 area.)

Kadashan

(A portion of Roadless Area 311 - Chichagof - see Appendix C.) This 33,861 acre area occupies the entire drainage of the Kadashan River on Chichagof Island, approximately five miles by water across Tenakee Inlet from the community of Tenakee Springs. The Kadashan River and its tributaries have high value fishery habitat and the area is an important local recreational and subsistence fishing and hunting area. The partially completed road from Corner Bay up the Kadashan drainage receives some motorized recreation use primarily associated with deer and brown bear hunting. The road has been a source of local controversy.

Trap Bay

(A portion of Roadless Area 312 - Trap Bay - see Appendix C.) This 6,555 acre area is located on Chichagof Island on the south side of the entrance to Tenakee Inlet about 10 miles from the community of Tenakee Springs. The single small drainage has high fish habitat value and is used for subsistence and occasional recreational fishing, as well as for deer and brown bear hunting. Trap Bay is the site of a proposed log transfer facility and a road connection related to the Alaska Pulp Company 1986-90 Operating Plan. The bay itself is a popular anchorage for subsistence, commercial and recreational activity, and is used by residents of Tenakee Springs. There is a stone quarry on the west side of the area.

Chuck River

(Portions of Roadless Areas 204 and 205 - Madan and Aaron - see Appendix C.) This 123,540 acre area stretches along the mainland coast from the Chuck River drainage and Windham Bay north across Holkam Bay (also known as Sumdum Bay) and includes a portion of the Snettisham Peninsula. The area is about 10 miles northeast of the logging community of Hobart Bay and about 70 miles south of Juneau. It is adjacent to the Tracy Arm-Fords Terror Wilderness on the east, and abuts areas of current and planned logging activity on the south and southeast. There are 25 known mineral deposits including seven previously-producing mines, and 250 unpatented mining claims. Recreation use has increased with the development of nearby Hobart Bay and private lands within this moratorium area. Subsistence use is moderate and would increase if Hobart Bay became a stable long-term community. Fish habitat values are high and the area is a large producer of pink, chum and coho salmon. Bear and furbearers are important recreational and subsistence resources. (The Southeast Conference proposal excludes Libby Creek, Dry Bay, and Snettisham Peninsula portions of the H.R. 987 area.)

South Kuiu (This area is identical with Roadless Areas 244,245 and 246 - Pillars, East Kuiu, South Kuiu - see Appendix C.) This area is comprised of 191,141 acres essentially surrounding the Tebenkof Bay Wilderness on Kuiu Island about 25 miles south of the community of Kake, and five miles from the logging camp at Rowan Bay. Its shoreline is characterized by numerous bays and islands. The Bay of Pillars on the north is easily accessible from nearby Rowan Bay and from the logging road along the north boundary. Fishery values are high; numerous bays and anchorages provide fishing and subsistence opportunities for fishing and bear hunting for residents of Kake, Port Protection, Point Baker and other communities. The area is currently closed to deer hunting. Portions of this moratorium area are included in the APC Long-term Sale Area. (Southeast Conference proposal includes only the Conclusion, Sumner and Strait Islands portion of the H.R. 987 area.)

Rocky Pass (Identical with Roadless Area 243 - Rocky Pass - see Appendix C.) Rocky Pass comprises 75,938 acres on both sides of the saltwater channel which separates Kuiu Island and Kupreanof Island, about 15 miles south of the community of Kake. This moratorium area has high fish and wildlife values, and is heavily used by residents of Kake for subsistence hunting. Big John Bay, which has a Forest Service recreation cabin and a trail connecting to the road system on Kupreanof Island, is popular for both recreation and subsistence use.

West Duncan Canal (Portions of Roadless Area 214 and 215 - South Kupreanof and Castle - see Appendix C). This 133,734 acre area is located along the west side of Duncan Canal, a long saltwater inlet on Kupreanof Island. It adjoins the Petersburg-Duncan Salt Chuck Wilderness, and includes Woewodski Island at the entrance to the Duncan Canal. High value fish habitat supports world-class fishing for steelhead, coho salmon and cutthroat trout. West Duncan Canal is also know for its excellent crab and shrimp fisheries. Sitka black-tailed deer, black bear and furbearers are supported by high value wildlife habitat. The moratorium area is also considered important for migratory waterfowl. The West Duncan Canal moratorium area receives high recreation and subsistence use from Petersburg (10 miles east), and has nine Forest Service recreation cabins and three short trails. Motorboat access is very common. Some 400 active mining claims and three past production sites can be found in this moratorium area including the Castle Island barite deposit. Several abandoned mines are considered visitor attractions.

South Etolin Island (A portion of Roadless Area 234 - South Etolin - see Appendix C.) This area comprises 83,170 acres on the south end of Etolin Island and several smaller islands about midway between Ketchikan and Wrangell on the Inland Passage, and about 15 miles north of the logging community at Thorne Bay across Clarence Strait. Although this moratorium area was recommended as Wilderness in the Tongass Land Management Plan, it was not designated as Wilderness by ANILCA. The area's main attractions are its moderate fish and wildlife values and its value as a popular subsistence use area for the residents of Wrangell. Elk have been introduced to Etolin Island and may have become established within the moratorium area. The multitude of small islands and passages provide numerous anchorages for recreation activities and small boat travel opportunities. These same features have led to study of potential sites for mariculture activities.

Naha River (A portion of Roadless Area 526 - North Revilla - see Appendix C.) The Naha River drainage is a 31,830 acre area located on Revillagigedo Island about 20 miles north of Ketchikan, and directly adjacent to the small community of Loring (population 20). The moratorium area is within the City and Borough boundary of

Ketchikan, which is not classified as a subsistence community, but the area receives some subsistence use from other communities. Naha River includes a large intertidal lagoon, or salt chuck, and numerous other large lakes which are accessible by floatplane. Motorized skiffs use the lagoon and several lakes. The moratorium area has high value fish habitat and receives both resident and non-resident fishing use, mainly for steelhead, coho salmon and cutthroat trout. Recreation facilities include an extensive trail system, six Forest Service recreation cabins, and the Orten Scout Ranch on private land. Due to its accessbility from Ketchikan and to the scenic and fishery values of the area, about one-third of the cabin use is by non-residents of Alaska.

Calder/Holbrook

(Includes Roadless Area 515 and 516 - Kosciusko and Calder - see Appendix C.) The 68,705 acre Calder/Holbrook moratorium area is located on the west side of north Prince of Wales Island and includes the unroaded portion of Kosciusko Island, the west shore of the El Capitan Passage, and numerous small islands. The area has high fish habitat values, and is used by residents of several nearby communities including Craig, Edna Bay, Point Baker and Klawock for both recreation and subsistence. In recent years, extensive roading and timber harvest of surrounding areas have focused significant local attention on the future of the Calder/Holbrook area. The area contains a number of mining claims and seven known mineral deposits including past producers of marble and zinc. Extensive limestone caverns have potential for recreation use and scientific study. (Southeast Conference proposal includes Conclusion, Sumner, and Strait Islands in its proposal for the Calder/Holbrook area.)

Sarkar Lakes

(A portion of Roadless Area 514 - Sarkar - see Appendix C.) The 50,875 acre Sarkar Lakes moratorium area is on north Prince of Wales Island between Whale Passage and El Capitan Passage. The area contains numerous interconnected lakes and canoeing is a rapidly increasing activity. Because of the waterways and adjacent logging road systems, access to this area for recreation and subsistence uses is relatively easy for residents of Thorne Bay, Coffman Cove and other small communities on Prince of Wales Island. Public use is increasing. Two Forest Service recreation cabins are accessible by floatplane. Fish habitat and wildlife habitat quality is high, and the lakes provide extensive sockeye salmon rearing areas.

Outside Islands

(Area is identical to Roadless Area 503 - Outer Islands - see Appendix C.) The Outside Islands consist of Noyes, Lulu, Baker, San Fernando and numerous smaller islands, totaling 97,259 acres, off the west coast of Prince of Wales Island. Access is primarily by boat from Craig and Klawock about 10 miles to the east. Baker and Noyes Islands face the open Pacific and have a variety of features associated with high energy seas, including sea stacks and large sandy beaches. These attractions, however, are difficult to access directly due to the absence of safe anchorages on the outer coast. Steamboat Bay is the most popular recreation anchorage. Fish and wildlife habitat values are moderate, and the area receives some subsistence use. There are several known mineral deposits and unpatented mining claims.

Karta River

(A portion of Roadless Area 510 - Karta - see Appendix C.) This 39,688 acre area includes the drainage of the Karta River system at the head of Kasaan Bay, about five miles from the communities of Kasaan and Hollis. Hollis is the only community on Prince of Wales Island served by the Alaska Marine Highway System, about three hours by ferry from Ketchikan. The area was recommended as Wilderness in the Tongass Land Management Plan but was not included in the ANILCA Wilderness designations. The Karta River moratorium area contains high value

fish habitat for coho salmon. The two major lakes, Salmon Lake and Karta Lake, are important spawning sites for sockeye salmon. One mine previously produced gold, and there are other known mineral deposits. Recreation use is high; the four Forest Service recreation cabins are in such demand that reservations are managed using a lottery system. Subsistence use is also very high.

Nutkwa (Includes nearly all of Roadless Area 531 - Nutkwa - see Appendix C.) This 52,576 acre area is adjacent to the west side of the South Prince of Wales Wilderness on Prince of Wales Island about 15 miles from the community of Hydaburg. Nutkwa has high fish habitat values with important production of coho and sockeye salmon. Subsistence use of sockeye salmon is significant, although overall subsistence and recreation use is moderate to light. There are several copper and lode gold mineral occurrences and one former producing mine. (The Southeast Conference proposal excludes the south half of the area in H.R. 987.)

Kegan Lake (A portion of Roadless Area 507 - Eudora - see Appendix C.) This 24,540 acre area is located on the northeast side of the South Prince of Wales Wilderness at the head of Moira Sound on Prince of Wales Island, about 25 air miles southwest of Ketchikan. The area contains Kegan Lake and a number of other lakes and streams which support a world class recreational fishery for coho salmon, steelhead, and rainbow trout. High value wildlife habitat for black bear, Sitka black-tailed deer and migratory waterfowl are present. This area contains 30 patented mining claims and mining for copper and marble has occurred in the past. Recreation facilities include two Forest Service recreation cabins, numerous anchorages and several trails. Recreational sportfishing and hunting area high.

Anan Creek (Identical with Roadless Area 209 - Anan - see Appendix C.) This 38,473 acre area is located on the Cleveland Peninsula adjacent to Bradfield Canal and Ernest Sound about 30 miles southeast of the community of Wrangell. It includes the Anan Creek drainage which contains Anan Lake, Boulder Lake and numerous small lakes. The Anan Creek system is one of the premier salmon producing streams in Southeast Alaska containing one of Southeast's largest pink salmon runs, as well as sockeye salmon, cutthroat and rainbow trout, and Dolly Varden. The Anan Creek fishery is important commercially and for subsistence; recreational fishing use is increasing. Deer, black bear and grouse are important subsistence and recreational resources. A powerline from the Tyee Hydroelectric Project crosses the area. Recreation use is high with two Forest Service recreation cabins, a bear viewing observatory, and numerous trails. Anan Bay is a heavily used anchorage.

Point Adolphus-Mud Bay (A portion of Roadless Area 311 - Chichagof - see Appendix C.) This 73,394 acre area occupies the north end of Chichagof Island about 10 miles west of the community of Hoonah and a few miles from the small community of Elfin Cove. Gustavus and Glacier Bay National Park are about 10 miles north across Icy Strait. Extensive estuarine areas and salmon spawning streams make this an important area for subsistence, recreational and commercial fishing. Important habitat for waterfowl and brown bear are located here. Marten and beaver are also important in the area. Subsistence use and recreation occur in Mud Bay, Idaho Inlet and numerous smaller bays and anchorages as well as on upland areas.

Pleasant/Lemesurier Islands (Includes Roadless Area 324 and portions of 311 - Pleasant Island and portions of Chichagof - see Appendix C.) This 23,096 acre Pleasant/Lemesurier moratorium area consists of Pleasant Island, Lemesurier Island and the Inian Islands in Icy Strait between Chichagof Island and Glacier Bay National Park. Although no major

fish streams are located on the islands, there is some deer and grouse habitat, and subsistence use does occur.

Sullivan

(A portion of Roadless Area 303 - Sullivan - see Appendix C.) This 3,984 acre island lies in the Lynn Canal about 20 miles south of Haines off the coast of the Chilkat Range. The Sullivan moratorium area contains limited fish habitat and no known anadromous fish streams. It has good habitat for deer, mink and marten. Recreation and subsistence uses are light, with most use originating in Haines.

Port Houghton/ Sanborn Canal

(A portion of Roadless Area 308 - Windham/Port Houghton - see Appendix C.) This 58,891 acre area is located on the mainland about 10 miles southeast of the logging community of Hobart Bay, and is adjacent to the Tracy Arm-Fords Terror Wilderness to the east. The area contains three important fish producing streams which contain pink, chum and coho salmon with steelhead, rainbow trout and Dolly Varden. The area has large populations of black bear, mountain goats, and provides important waterfowl habitat. Deer populations are currently low. Sanborn Canal and Port Houghton support commercial salmon, crab and halibut fisheries. Recreation and subsistence use are generally increasing as a result of the development of Hobart Bay.

DEMAND ASSESSMENT

The 23 areas represent the demand for additional Wilderness designation or other forms of preservation as expressed by the passage of H.R. 987 in the House of Representatives, and as expressed by some conservation interests. In general, demand for primitive types of recreation has increased nationwide and in Alaska. Several of the areas which are near communities, such as Naha, Berners Bay, Karta River, Young Lake, Lisianski, Kadashan, and Thorne River, receive relatively high recreation use. As much as one-third of the recreation use in some areas, such as Naha, is by non-residents of Alaska, indicating a relatively high willingness to pay for high quality fishing and undeveloped scenic surroundings.

In addition there is growing demand for protection or preservation of natural environment areas and biological diversity in response to emerging concern over global issues including acid precipitation, atmospheric carbon dioxide levels, deforestation, and population growth.

EXISTING DIRECTION

Approximately 68 percent of the total area was allocated to Land Use Designation (LUD) 3 and 4 in the Tongass Land Management Plan, meaning that a significant portion of 16 of the moratorium areas are currently available for a variety of management activities including timber harvest. Twenty-five percent was allocated to LUD 2 which precludes timber harvest. Five areas, Sullivan Island, Berners Bay, Anan Creek, Naha, and Kegan Lake were allocated entirely to LUD 2. Two of the moratorium areas, South Etolin Island and Karta River, are in LUD 1 "released." These two areas were considered for designation as Wilderness during the preparation of the Alaska Lands Act (ANILCA) but were "released" when the Act was enacted in 1980. The 1985-86 amendment to the Tongass Land Management Plan concluded that these two areas would be managed to allow only existing uses and that future uses would be determined when the Forest Plan is revised.

Table 3-68 displays the acreage of each of the moratorium areas and acreage of non-National Forest land, tentatively suitable timberland, and LUD designation.

TABLE 3-68
MORATORIUM AREA INFORMATION

TABLE 3-68

Size, Amount of Tentatively Suitable Timberland, and Land Use Designation of Moratorium Areas in H.R. 987

(All figures are in acres)

Area	Nat. Forest Lands	Private Lands	Tentatively 1/ Suitable	LUD I	LUD II	LUD III	LUD IV	Roaded	Longterm Sale Area
Yakutat Forelands	218,560	226	48,732	0	92,791	125,149	0	165	
Berners Bay	45,954	20	9,044	0	39,862	6,092	0	0	
Young Lake	18,482	0	7,889	0	0	18,482	0	0	
Chichagof (Lis/Hoonah)	352,225	60	72,568	0	96,479	101,401	154,374	0	APC
Kadashan	33,861	120	13,493	0	0	33,241	620	0	APC
Trap Bay	6,555	0	3,158	0	0	0	6,555	0	APC
Chuck River	123,540	1,000	61,572	0	22,070	17,827	83,643	0	
South Kuiu	191,141	60	92,679	0	2,098	83,694	105,349	259	APC
Rocky Pass	75,938	580	27,543	0	74,740	877	320	1,415	APC
West Duncan Canal	133,734	20	37,108	0	0	69,520	64,274	3,497	
South Etolin Island	83,170	0	27,516	83,170	0	0	0	360	
Naha	31,830	20	16,075	0	31,830	0	0	40	KPC
Calder/Holbrook	68,705	0	40,643	0	0	0	68,705	3,809	KPC
Sarkar Lake	50,875	0	24,455	0	25,486	17,748	7,621	2,280	KPC
Outside Islands	97,259	180	42,261	0	0	0	97,239	0	KPC
Karta River	39,688	280	21,494	39,688	0	0	0	20	KPC
Nutkwa	52,576	840	28,070	0	0	9,804	42,773	0	KPC
Kegan Lake	24,540	360	9,175	0	24,540	0	0	0	KPC
Anan Creek	38,473	0	8,343	0	38,253	0	0	60	
Point Adolphus/Mud Bay	73,394	160	22,621	0	120	39,120	34,154	0	APC
Pleasant/Lemesurier Is.	23,096	80	9,318	0	18,837	4,260	0	0	APC
Sullivan Island	3,984	40	2,021	0	0	3,984	0	0	
Port Houghton/Sanborn Canal	58,891	0	25,096	0	710	41,111	17,050	0	
TOTAL FOR ALL AREAS	1,885,340	4,046	650,875	122,638	467,816	572,310	682,677	11,905	

1/ Tentatively suitable timberlands from the TLMP Revision data base are significantly greater than "suitable acres" identified in Forest Service testimony on HR 987. That testimony did not include lands in LUD I "released" or LUD II, and was further reduced by consideration of fish, wildlife and visual "retention" factors in TLMP.

RESULTS OF TLMP IMPLEMENTATION

Since 1979, only a few small portions of these areas have been modified as a result of implementation of the Forest Plan. For example a road has been constructed in the Kadashan area as part of the APC long term sale, although no harvest has occurred.

OPPORTUNITIES AND CONCERNS

The 23 moratorium areas include many areas identified in scoping as having some level of public opposition to the development of roads and timber harvest. Their designation as Wilderness or management with other non-development emphases would somewhat reduce conflict over land use allocation on the Tongass, since nearly 2/3 of the area is currently allocated to LUD 3 or LUD 4. However, there are a number of other LUD 3 and LUD 4 areas where proposals for timber harvest have met or would likely meet with sufficiently strong opposition that the Forest Service has deferred planned activities. Not all of the areas have local public support for Wilderness designation. Residents of Yakutat, specifically, are strongly opposed to designation of the Yakutat Forelands as Wilderness, and desire management to emphasize wildlife, fisheries and subsistence use. Some of the areas have highly significant "wilderness" attributes, and could potentially add to ecosystem representation in the National Wilderness System; other do not. A few areas such as Berners Bay and Naha potentially conflict with State opportunites for long-range transportation links to Canada.

Several areas such as Naha, Berners Bay, Kegan Lake, Young Bay and West Duncan Canal currently have high levels of recreation use and recreation facility needs resulting from increasing recreation demand. The desire for some protective management or Wilderness designation appears in part to stem from a strong desire to retain primitive and semi-primitive recreation settings. The Plan Revision, which includes additional prescriptions for land use allocation to primitive recreation, old growth wildlife habitat, and riparian management could provide protection from road construction and timber harvest while retaining the flexibility to meet growing recreation demand and other management needs in these areas, as noted in Forest Service testimony on H.R. 987. (Testimony of George Leonard, Associate Chief, before the Subcommittee on Water, Power and Offshore Energy Resources, Committee on Interior and Insular Affairs, House of Representatives, March 14, 1989.)

OLD-GROWTH FORESTS

OVERVIEW

The National Old-Growth Task Group, organized by the Forest Service, developed the following generic definition and description of old-growth forests (ref: letter from the Washington Office, dated October 11, 1989):

Definition

Old-growth forests are ecosystems distinguished by old trees and related structural attributes. Old growth encompasses the later stages of stand development that typically differ from earlier stages in a variety of characteristics which may include tree size, accumulations of large dead woody material, number of canopy layers, species composition, and ecosystem function.

Description

The age at which old-growth develops and the specific structural attributes that characterize old growth will vary widely according to forest type, climate, site conditions and disturbance regime. For example, old-growth in fire-dependent forest types may not differ from younger forests in the number of canopy layers or accumulation of down woody material. However, old-growth is typically distinguished from younger growth by several of the following attributes:

1. Large trees for species and site.
2. Wide variation in tree sizes and spacing.
3. Accumulations of large-size dead standing and fallen trees that are high relative to earlier stages.
4. Decadence in the form of broken or deformed tops or bole and root decay.
5. Multiple canopy layers.
6. Canopy gaps and understory patchiness.

Compositionally, old growth encompasses both older forests dominated by early seral species, such as fire-dependent species, and forests in later successional stages dominated by shade tolerant species. Rates of change in composition and structure are slow when compared to younger forests. Different stages or classes of old growth will be recognizable in many forest types.

Sporadic, low to moderate severity disturbances are an integral part of the internal dynamics of many old-growth ecosystems. Canopy openings resulting from the death of overstory trees often give rise to patches of small trees, shrubs, and herbs in the understory.

Old-growth is not necessarily "virgin" or "primeval." Old-growth may develop following human disturbances.

The structure and function of an old-growth ecosystem will be influenced by its stand size and landscape position and context.

Region 10 & Tongass Old Growth Overview

The following brief overview of: 1) the vegetation data for the Tongass National Forest; 2) work completed by a Regional Old Growth Task Group; 3) recent direction from the Washington Office; 4) steps the IDT used to quantify the current old-growth condition on the Forest, provides pertinent background information in understanding how old growth can currently be identified and classified on the Tongass National Forest.

Vegetation Data

The Forest's timber type maps are used as the vegetation data base for the Tongass Forest Plan Revision. These maps were completed in 1978, and have been updated since then to account for land status changes and timber harvest activity. The timber type maps were digitized into a computer Geographic Information System database to provide spatial data and quantitative analysis capabilities for the Revision. The timber type maps identify the following attributes which are pertinent to old growth identification and quantification: productivity, forest type, size classes (generally synonymous with age classes), strata classes (formerly called volume classes).

Productivity: The timber type maps separate forested lands into two major productivity classes: 1) productive lands, which have been inventoried as being capable of producing 20 cubic feet per acre of useable timber volume; 2) low productivity lands, which have been inventoried as not being capable of producing 20 cubic feet per acre of useable timber volume. The first category is usually called productive forested lands, and the second category unproductive forested lands. Both productive and unproductive forested lands contain old-growth forests.

Forest Types: Forest types are identified for the productive forest lands, and include the following: hemlock (no distinction is made between western hemlock and mountain hemlock), spruce, hemlock/spruce, cedar (mixed cedar/hemlock stands are not identified in the Forest-wide GIS database; these acres will be included in the hemlock type), red alder, and black cottonwood. Red alder is generally associated with early forest successional stages and is not considered an old-growth forest type. Black cottonwood is also generally associated with early forest successional stages; on some of the mainland rivers it may develop into a persistent stage and may be considered an old-growth cottonwood type.

Size Classes: Size classes identified for the productive forest lands include: currently non-stocked, seedling, pole timber, young-growth sawtimber, old-growth sawtimber. For identifying old growth, only the old-growth sawtimber size class is used. Following is a discussion of the characteristics of the old-growth sawtimber size class.

The timber inventory used 150 years as a breakpoint age for separating young growth (less than 150 years) and old growth (greater than 150 years). Even though 150 years was used as the breakpoint age, over 95 percent of the trees sampled in uncut timber stands were greater than 150 years. Most of these stands were well beyond 150 years and were also classed as uneven-aged stands.

There is no timber inventory age category for trees greater than 300 years, counting of tree rings stops when 300 is reached. However, a study of 1,234 trees, 11.0 inches and larger DBH from random locations in old-growth mixed hemlock/spruce stands showed an average tree age at DBH of 282. This is not the true tree age however, because trees in this forest type may take from 7 to 50 years to reach 4 1/2 feet in height (DBH). Therefore, the actual age of sample trees could have been 289 to more than 332 years. The same study indicated that an average of one tree per three acres is older than 600 years (Forest Service memo prepared by B.Wilson and F.Samson for the National Old Growth Task Group).

In summary, most (about 95 percent) of the uncut stands identified in the timber inventory as old growth will be classified as uneven-aged stands and will have trees much older than 150 years.

A few stands identified as old growth on the timber type maps do not have the characteristics of old growth stands. Most of these stands are located near Yakutat (and perhaps a few other places on the mainland) and represent the first trees to occupy sites after glaciers have receded. They are identified as old growth because tree ages are between 150 and 200 years. However, these stands are even-aged, and they do not have many of the structural old-growth characteristics associated with other old-growth stands in Southeast Alaska. Because they are even-aged, the stands have not developed patchy or multi-layered canopies, they have developed understory shrubs, but not a well developed understory forb layer, and large diameter snags and downed woody logs are generally lacking because the larger trees have not had time to die and fall over yet. Table 3-69 summarizes the timber stand ages for the Yakutat area, illustrating the young ages for these stands. About 28 stands have tree ages between 150 years and 200 years.

TABLE 3-69
SUMMARY OF TIMBER STAND AGES WITHIN EACH VCU AT YAKUTAT.

VCU	AVERAGE AGE FOR EACH TIMBER STAND IN THE VCU									
389	100	91	120	118	120	147	150	137		
388	147	133	121	141						
387	133	149	131							
386	130	143	86	118	150	142	150	108	129	122
382	157	165	133	145	150	153	148	157	101	157
	162	123	153	200	200	165	179	147	133	121
	141									
379	91	50	102	80						
384	120	97	99	135	78	94	85			
375	171	163	177	119	107	90	87	106		
376	134	106	88	100	166					
373	165	125	106	97	92	177	128	133	132	156
	207	178	160	137	128	116	168	145	150	113
	126	102	175	93	99	148	98	125		
372	118	180	100	106	118	99	103	126		
364	116	114	116							

Source: Juneau Ranger District timber stand exams; stand ages were written on an aerial photo mosaic covering the entire Yakutat area.

Volume Classes/Strata Classes: Productive forested lands are separated into four classes originally termed volume classes, with the intent of placing productive forested lands into classes based on net volume per acre. The four volume classes were as follows: volume class 4 = 8,000 to 20,000 board feet per acre; volume class 5 = 20,000 to 30,000 board feet per acre; volume class 6 = 30,000 to 50,000 board feet per acre; and volume class 7 = 50,000 + board feet per acre. The classes were delineated on aerial photos, and recognized relative differences in stand characteristics which could be seen on aerial photos. However, the differences discernible on aerial photos may not always equate to the net volume per acre of the stand. This situation has recently been evaluated with analysis of the timber type mapping with 515 forest timber inventory plots.

During the 1980's, about 515 forest inventory plots were established to gather statistically reliable information on the timber production potential and stand characteristics for the three Administrative Areas of the Forest. Information gathered from the 515 forest inventory plots, when compared with the volume class information from the timber type maps, indicated that the volume classes on the timber type maps did not always coincide with the volumes from the forest inventory plots. The primary reasons for this variation are:

1. The timber type mapping assigned values for the polygon as-a-whole. The value of the polygon was based on the majority of the contents within its boundary. This meant that if the majority of the polygon was rated high volume and the forest inventory plot fell in a blowdown patch, or in the transition areas between the high volume polygon and one of lesser volume, the resultant forest inventory volume would not be the same as that of the timber type map.

2. The forest inventory plots were not designed to statistically sample the volume classes on the timber type maps. Few of the forest inventory plots fell within the higher volume classes on these maps. The result is that it is not possible to reliably conclude that either the forest inventory plots or the timber type mapping is in error.

3. Old-growth forest conditions are naturally heterogeneous. Plots within these stands will show variation due to the natural openings, second growth, multi-storied layering, variations in tree sizes, etc. One plot within a stand or polygon containing old-growth forest conditions cannot be a representative sample of the entire polygon characteristics.

Other timber inventory data suggests that in some areas of the Forest, the volume classes on the timber type maps may be fairly accurate. For example, stand exam information presented in the FEIS for the 1989-94 Operating Period for the Ketchikan Pulp Company Long-term Sale Area suggests good correlation with the volume classes. At the present time, the reliability of the volume classes on the timber type maps is debated. Therefore, instead of continuing to refer to them as volume classes, they are now called strata classes. Strata A = stands mapped as volume class 4; Strata B = stands mapped as volume class 5; Strata C = stands mapped as volume class 6; and Strata D = stands mapped as volume class 7. Work is currently progressing on gaining a better understanding of the strata classes. The Timber Section of Chapter 3 of the AMS contains additional information discussing the variability of the strata classes, and on-going work to obtain better information for the timber resources.

Unproductive Forested Land: Unproductive forested land does not have forest types, size classes, or strata classes identified. Unproductive forest lands are identified by the following categories: low productivity due to alder, glacier, high elevation, low site index, muskeg, rock cover, slide zone, willow. Unproductive forested land in the categories of low productivity due to alder, glacier, slide zone, and willow are generally younger stands of trees. Unproductive forested land in the categories of high elevation, low site index, muskeg, and rock cover are generally old-growth stands.

Regional Old-Growth Task Group

An old-growth task group and workshop was organized in May 1988, and included representatives from the Forest Service, Alaska Department of Fish and Game, and the University of Washington, Seattle. The workshop participants took an initial step in recognizing different types of old-growth forests and defining the characteristics for different types. The old-growth types were based on recent plant association classification work (Martin, 1989). The workshop identified seven types of old-growth conifer forests:

1) Highly productive Sitka spruce, western hemlock, and spruce/hemlock in upland areas
2) Highly productive Sitka spruce, western hemlock, and spruce/hemlock in riparian areas
3) Highly productive Sitka spruce, western hemlock, and spruce/hemlock in beach fringe areas
4) Moderately productive Sitka spruce, western hemlock, and spruce/hemlock
5) Cedar/western hemlock
6) Mixed conifer
7) Subalpine mountain hemlock

The results of the workshop were presented at the 54th North American Wildlife and Natural Resources Conference in a paper titled: "Conservation of Rain Forests in Southeast Alaska: Report of a Working Group," (Samson et al., 1989). Table 3-70 summarizes tree and stand characteristics for each of these seven types. The Regional old-growth task group also recommended accounting for old growth distribution on the Forest by dividing the Forest into 18 provinces (Samson et al., 1989).

TABLE 3-70

DESCRIPTIONS OF SEVEN OLD-GROWTH ASSOCIATIONS FOUND IN SOUTHEAST ALASKA.

Tree/Stand Characteristics 2/	HPU 1/	HPR	HPB	MP	CWH	MC	SMH
Tree height (in feet)	120	130	130	80	80	60	45
Tree diameter (in inches)	25	30	30	25	15	13	12
Tree age (in years)	200	200	200	200	200	200	200
Multi-layered canopy	yes	yes	yes	yes	yes	yes	yes
Discontinuous canopy	yes	yes	yes	yes	yes	yes	yes
Snag height (in feet)	12	30	20	15	15	-	15
Snag diameter (in inches)	25	30	30	15	15	-	10
Snag number	2	2	2	8	2	15	8
Woody debris length (in feet)	5	50	50	20	20	-	-
Woody debris diameter(in inches)	25	30	30	10	15	-	30
Woody debris number	4	4	4	8	4	-	4
Minimum area 3/ 4/(in acres)	120	-	60	100	60	50	60
Minimum core size	60	-	-	50	35	30	35
Minimum core width	900	-	500	800	700	700	750
Minimum number of old-growth trees/acre	90-110	90-110	90-110	70-89	70-89	40-69	<40

Source: Samson et al, 1989.

1/ Legend for seven old growth types:

Highly productive Sitka Spruce-Western Hemlock	=	HPU
Highly productive Sitka Spruce-Western Hemlock Riparian	=	HPR
Highly productive Sitka Spruce-Beach Fringe	=	HPB
Moderately productive western hemlock	=	MP
Cedar-Western Hemlock	=	CWH
Mixed Conifer	=	MC
Subalpine Mountain Hemlock	=	SMH

2/ All values are equal to or greater than.

3/ Minimum area includes a core area and surrounding tree buffer of three three heights. The buffer may be forest types other than the core type with a tree height at least 75 percent of the core height.

4/ Minimum riparian area is a core area as wide as the riparian corridor. The buffer is the natural adjacent plant community. Core area is 1/2 mile in length. Minimum beach area is the width of the beach fringe zone 500 feet from mean high tide. Length is based on requirements of bald eagles in Southeast Alaska and is slightly more than 1 mile. A 1 mile by 500 foot zone results in a minimum area of 60 acres.

The Tongass Forest Plan Revision IDT began working with these seven types identified at the workshop, with the intent of displaying old-growth acreages by the seven types. Because soil inventories and mapping have not been completed for most Wilderness areas, plant association information is not available for them. Lacking this plant association information, it is not be possible to provide a Forest-wide accounting of old growth by these seven types.

Working with these seven types has raised several questions. These questions are summarized below. Most of these questions can probably be answered by more understanding of plant associations, more complete inventory information, and fine tuning of the original seven definitions.

1) The seven types did not appear to cover all of the old growth situations on the Forest. For example, in riparian areas, only a highly productive Sitka spruce and western hemlock type was identified and defined. However, moderately productive and unproductive old-growth forest types appear to be present in riparian areas. Only one beach fringe type is identified, highly productive Sitka spruce; old-growth forests along the beach also include cedar, hemlock, and hemlock/spruce stands with a variety of productivities.

2) The seven old growth definitions recommend minimum sizes, with a core area size which must represent the particular old-growth type. Minimum sizes are important to maintain functional old growth systems. However, there is concern that rigid adherence to size requirements based on each individual type would result in numerous acres of that particular type of old growth not being accounted for, even in undisturbed areas such as Wilderness areas. The reason for this concern is outlined as follows: The IDT pilot tested four quads from the GIS database. These quads were mostly unlogged, where natural old-growth sizes were evaluated. Table 3-71 summarizes the results of that sampling. The results indicate that rigid adherence to size requirements for each separate type in the current proposed definitions may result in numerous natural acreages not being accounted as a particular old-growth type. Old growth appears to be a highly variable mosaic of species and strata, and functional old growth systems may involve a combination of types which are adjacent to each other. Additional research is needed to understand the effects of old-growth type and stand size relating to adjacent types and stand sizes, and how the types and stands all fit together.

TABLE 3-71
IF A MINIMUM CORE AREA SIZE OF 60 ACRES IS REQUIRED FOR OLD GROWTH HABITAT DEFINITIONS, WHAT PERCENT OF THE NATURAL OLD GROWTH ACRES ON A TIMBER TYPE MAP WOULD NOT MEET THE MINIMUM SIZE REQUIREMENT?

QUAD	Strata Class	Total Old Growth Acres	Percent of Acres in Stands Less Than 60 Acres in Size
Craig	C1A	17,563	26
	B	18,283	26
	C	1,223	51
	D	214 (2 stands)	8
Craig A1	A	19,009	60
	B	15,086	56
	C	8,891	49
	D	11,237	26
Ktn D3	A	16,398	30
	B	6,455	19
	C	580 (10 stands)	36
	D	1,249	38
Brc A6	A	3,180	34
	B	1,962	39
	C	823 (5 stands)	10
	D	0	--

Source: Revision IDT.

3) Definitions which include core areas of a particular old-growth type surrounded by buffers create numerous accounting problems which would make it almost impossible to account for acreages and monitor these acreages over time. No two people could come up with the same acreage figures using the exact same maps.

4) Although old growth areas may need to be a minimum size for ecological functions, old growth may have value for a variety of resource uses with a variety of sizes. For example, old-growth being valued or evaluated for a campground, a cultural site, habitat for fish, habitat for wildlife species, and/or plant communities, may result in different requirements for sizes.

Recent Direction from the WO

In a letter dated October 11, 1989, the Washington Office directed the Regional Offices and Experiment Stations to prepare a list, by Region, of the forest types or type groups for which old-growth definitions are to be developed. The Society of American Foresters classification of forest cover types was to be used in preparing these lists. The Society of American Foresters cover types for the Tongass National Forest are displayed in TABLE 3-72.

TABLE 3-72
SOCIETY OF AMERICAN FORESTERS COVER TYPES FOR PROPOSED OLD-GROWTH DEFINITIONS.

Type Number	Cover Type
205	Mountain Hemlock
218	Lodgepole Pine
223	Sitka Spruce
224	Western Hemlock
225	Western Hemlock/Sitka Spruce
226	Coastal True Fir/Western Hemlock
227	Western Red Cedar/Western Hemlock
228	Western Red Cedar

SUPPLY/INVENTORY

Utilizing the information presented in the Overview for this section, the IDT developed the following approach to display old-growth forest data for the Tongass National Forest:

1. Use the existing timber type maps, digitized in the GIS database, as the best available forest-wide data source to identify old-growth forests.

2. Use the old-growth size class on the timber type maps for identifying old growth stands, recognizing that most (estimated 95 percent) of the time the stands will be over 200 years old. Where information is available (such as at Yakutat) identify stands which are not over 200 years old. This attempts to follow age recommendations from the Regional Old Growth Task Group.

3. Recognize two general productivity classes:
   a. Unproductive old growth, capable of producing less than 20 cubic feet per acre of usable timber volume per year. Additional breakdown of unproductive old growth by species or other groupings is not available in the GIS database.
   b. Productive old growth, capable of producing 20 cubic feet or more per acre of usable timber volume per year. Recognize four Strata Classes for productive old growth (A, B, C, D), and four species or species groupings (cedar, hemlock, spruce, and hemlock spruce).

4. Display old growth by seven landscape locations: estuary fringe, beach fringe, riparian, upland below 800 feet elevation, upland from 800 to 1,500 feet elevation, subalpine, and alpine. Definitions for these landscape locations are provided later in this section. Old growth location in the landscape recognizes important ecological functions. For example, riparian old growth includes fish habitat, riparian-dependent wildlife habitat, specific plant associations.

5. Display old growth distribution on the Forest by the 50 geozones. The 50 geozones provide finer resolution of old growth distribution than the 18 provinces developed by the Regional Old Growth Task Group.

6. Provide a first approximation of displaying old growth by the Society of American Foresters cover types classification.

Evaluations of old-growth stand sizes or patch sizes are not presented here. The Forest-wide GIS database does not permit evaluations of this kind. As discussed in the Overview above, old-growth patch sizes must be evaluated for specific purposes and functions. Information on old-growth wildlife patch sizes can be found in the Chapter 3 sections on Wildlife, Threatened and Endangered and Sensitive Species, and Biological Diversity.

[Special note: The old-growth acres presented in the following tables will not add up perfectly between all of the tables. Several computer programs were developed to obtain these acreages from the GIS database; these different programs resulted in an acreage difference of 164 acres. This is an artifact of GIS digitizing and subsequent programming challenges.]

Table 3-73 provides a general summary of the old-growth acres on the Tongass National Forest. There are a total of 8.7 million acres of old growth, with 3.6 million classified as unproductive conifer old growth, 5.08 million classified as productive conifer old growth, and 8.8 thousand classified as cottonwood old growth.

TABLE 3-73
ACRES OF CONIFER AND COTTONWOOD OLD GROWTH FORESTS ON THE TONGASS NATIONAL FOREST.

Unproductive Conifer Old Growth (includes shorepine, and other unproductive acres of cedar, western and mountain hemlock, hemlock/spruce, and spruce)	3,566,317 acres
Productive Conifer Old Growth (includes productive cedar, western and mountain hemlock, hemlock/spruce, and spruce)	5,084,114 acres
Cottonwood	8,868 acres
Total Old Growth	8,659,299 acres

Source: Revision database, December 19, 1989.

The GIS database does not contain species information for the unproductive conifer old-growth acres. The productive conifer old growth acres can be divided into four species groups, and each species group can be divided into four strata classes. Table 3-74 displays this information. Of the 5.08 million acres of productive old-growth forest, one percent is cedar, 60 percent is western and mountain hemlock, 38 percent is hemlock/spruce, and 2 percent is spruce.

The four strata classes comprise the following percentages of the 5.08 million acres: Strata A - 50 percent, Strata B - 39 percent, Strata C - 9 percent, and Strata D - 2 percent.

TABLE 3-74
PRODUCTIVE CONIFER OLD GROWTH ACRES BY SPECIES AND STRATA CLASSES.

	Strata				Total Each
Species	A	B	C	D	Species
Cedar	34,912	1,000	-	-	35,912
Western and Mountain Hemlock	1,896,339	993,335	136,521	8,601	3,034,796
Hemlock/Spruce	573,910	972,035	295,563	72,577	1,914,085
Spruce	23,360	36,961	29,512	9,652	99,485
Total Each Strata	2,528,521	2,003,331	461,596	90,830	5,084,278

Source: Revision database, December 19, 1989.

Table 3-75 displays productive conifer old growth acres by seven landscape locations:

Estuary Fringe. This is defined as the area of land within a 1,000 foot horizontal distance inland from the Revision GIS shoreline around all identified estuary areas in the Revision GIS database.

Coast or Beach Fringe. This is defined as the area of land within a 500 foot horizontal distance inland from the Revision GIS shoreline along the entire coastline, but not including the area of land already within the estuary fringe.

Riparian. This is defined as a minimum 100 foot wide zone along both sides of all streams that have been digitized in the Revision GIS database; some stream channel types have a 150 foot wide zone along both sides; if riparian soil mapping units are wider than the 100 or 150 foot zone, then the width of the soil mapping unit is the width of the zone. The riparian unit does not include any acres already included within the estuary fringe or the beach fringe.

Upland less than 800 feet in elevation. This is defined as all upland areas below 800 feet, but not including any acres already included within the estuary fringe, beach fringe, or riparian units.

Upland from 800 to 1,500 feet in elevation. This is defined as all upland areas from 800 feet to 1,500 feet in elevation, but not including any acres within the previous units if there is overlap.

Subalpine. This is defined as all upland areas from 1,500 feet in elevation to 2,000 feet, but not including any acres within the previous units if there is overlap.

Alpine. This is defined as all upland areas above 2,000 feet in elevation, but not including any acres within the previous units if there is overlap.

TABLE 3-75
PRODUCTIVE CONIFER OLD GROWTH ACRES BY LANDSCAPE POSITION. 1/

Species	Strata	Estuary Fringe	Beach Fringe	Riparian	Upland <800 ft	Upland 800-1500 ft	Sub-alpine	Alpine	Totals
Cedar	A	260	5,507	2,183	22,402	4,260	260	40	34,912
	B	40	60	20	620	260	0	0	1,000
Western and	A	30,468	107,075	110,448	804,118	542,609	223,109	78,512	1,896,339
Mountain	B	21,549	58,559	70,242	445,968	305,979	76,279	14,759	993,335
Hemlock	C	2,221	5,863	10,783	69,130	41,411	6,515	598	136,521
	D	80	481	660	5,299	1,961	100	20	8,601
Hemlock/Spruce	A	21,531	64,288	47,713	239,004	147,895	43,892	9,587	573,910
	B	39,985	91,967	94,969	416,132	255,039	60,112	13,831	972,035
	C	8,363	21,196	35,541	142,679	74,109	12,675	1,000	295,563
	D	1,460	5,500	9,283	39,189	14,144	2,721	280	72,577
Spruce	A	1,300	1,609	3,439	6,895	7,400	2,299	418	23,360
	B	3,382	4,538	6,813	14,471	6,440	939	378	36,961
	C	1,939	2,255	9,856	11,241	3,701	460	60	29,512
	D	200	616	2,760	4,978	1,058	40	0	9,652
Total		132,778	369,514	404,710	2,222,126	1,406,266	429,401	119,483	5,084,278

Source: Revision database, December 19, 1989.

1/ Estuary fringe and riparian acres do not include Wilderness areas, because GIS data was not available to identify estuaries and riparian areas in Wilderness. The acres which would have been in estuary fringe and riparian areas in Wilderness are included in the upland old-growth acres.

Table 3-76 summarizes the amount of old-growth by type and Administrative Area. Table 3-77 displays the distribution of old growth throughout the 50 geozones. All geozones, except for geozones C17, C22, and C24, which are located at Yakutat, currently contain old-growth forests.

TABLE 3.76
PERCENTAGE OF OLD-GROWTH TYPES BY ADMINISTRATIVE AREA

	Administrative Area		
	Chatham	Stikine	Ketchikan
Productive old-growth cedar	-	3	97
Productive old-growth spruce	72	11	17
Productive old-growth Western and Mountain Hemlock	27	27	46
Productive old-growth hemlock/spruce	53	21	26
Old-growth cottonwood 1/			

1/ All of the old-growth cottonwood acres are located in geozones on the mainland, and are primarily associated with riparian areas.

TABLE 3-77

ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

		Geozone							
Species	Strata	C01	C02	C03	C04	C05	C06	C07	C09
Cottonwood		0	0	0	0	0	0	0	0
Unproductive Conifer		25,093	33,265	19,018	2,579	29,391	54,004	6,463	48,910
Productive Conifer									
Cedar	A	0	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0	0
Western and	A	7,543	47,569	5,777	7,258	7,431	39,605	3,079	11,686
Mountain	B	1,261	12,281	320	3,259	460	7,155	520	1,801
Hemlock	C	0	760	0	0	0	80	0	0
	D	0	0	0	0	0	0	0	0
Hemlock/Spruce	A	18,506	29,632	8,759	3,119	18,119	44,540	20	34,547
	B	16,068	45,741	2,880	4,939	11,644	49,687	60	29,850
	C	2,300	11,668	0	1,040	2,138	5,573	0	520
	D	0	0	0	0	0	20	0	0
Spruce	A	1,040	1,341	540	140	459	2,379	0	741
	B	2,221	4,524	1,920	140	939	5,535	0	1,041
	C	1,341	4,823	80	300	460	4,553	0	1,563
	D	0	140	0	0	0	560	0	0
Total Productive Conifer		50,280	158,479	20,276	20,195	41,650	159,687	3,679	81,749
Total Cedar		0	0	0	0	0	0	0	0
Total Hemlock		8,804	60,610	6,097	10,517	7,891	46,840	3,599	13,487
Total Hemlock/Spruce		36,874	87,041	11,639	9,098	31,901	99,820	80	64,917
Total Spruce		4,602	10,828	2,540	580	1,858	13,027	0	3,345
TOTAL STRATA A		27,089	78,542	15,076	10,517	26,009	86,524	3,099	46,974
TOTAL STRATA B		19,550	62,546	5,120	8,338	13,043	62,377	580	32,692
TOTAL STRATA C		3,641	17,251	80	1,340	2,598	10,206	0	2,083
TOTAL STRATA D		0	140	0	0	0	580	0	0
% Cedar		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% Hemlock		17.5	38.2	30.1	52.1	18.9	29.3	97.8	16.5
% Hemlock/Spruce		73.3	54.9	57.4	45.1	76.6	62.5	2.2	79.4
% Spruce		9.2	6.8	12.5	2.9	4.5	8.2	0.0	4.1
% STRATA A		53.9	49.6	74.4	52.1	62.4	54.2	84.2	57.5
% STRATA B		38.9	39.5	25.3	41.3	31.3	39.1	15.8	40.0
% STRATA C		7.2	10.9	0.4	6.6	6.2	6.4	0.0	2.5
% STRATA D		0.0	0.1	0.0	0.0	0.0	0.4	0.0	0.0

TABLE 3-77 continued
ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

		Geozone							
Species	Strata	C10	C11	C12	C13	C14	C15	C16	C17
Cottonwood		0	0	0	0	0	0	40	0
Unproductive Conifer		110,456	26,252	87,105	80,596	29,289	196,666	19,957	0
Productive Conifer									
Cedar	A	0	60	0	20	0	0	0	0
	B	0	0	0	0	0	0	0	0
Western and	A	33,495	8,558	5,765	30,984	17,503	174,604	2,280	0
Mountain	B	3,249	1,561	480	4,981	1,643	113,398	700	0
Hemlock	C	60	0	0	40	0	21,983	60	0
	D	0	0	0	0	0	380	0	0
Hemlock/Spruce	A	62,534	12,394	23,150	16,446	5,300	48,917	1,460	0
	B	33,087	7,681	6,083	10,635	7,711	113,336	2,421	0
	C	1,665	440	1,619	1,720	862	61,094	700	0
	D	20	0	0	0	0	5,516	0	0
Spruce	A	790	318	800	60	479	719	6,360	0
	B	2,142	279	981	80	520	2,418	940	0
	C	420	100	1,340	0	0	1,939	400	0
	D	40	0	0	0	0	1,079	0	0
Total Productive Conifer		137,502	31,391	40,218	64,966	34,018	545,383	15,321	0
Total Cedar		0	60	0	20	0	0	0	0
Total Hemlock		36,804	10,119	6,245	36,005	19,146	310,365	3,040	0
Total Hemlock/Spruce		97,306	20,515	30,852	28,801	13,873	228,863	4,581	0
Total Spruce		3,392	697	3,121	140	999	6,155	7,700	0
TOTAL STRATA A		96,819	21,330	29,715	47,510	23,282	224,240	10,100	0
TOTAL STRATA B		38,478	9,521	7,544	15,696	9,874	229,152	4,061	0
TOTAL STRATA C		2,145	540	2,959	1,760	862	85,016	1,160	0
TOTAL STRATA D		60	0	0	0	0	6,975	0	0
% Cedar		0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
% Hemlock		26.8	32.2	15.5	55.4	56.3	56.9	19.8	0.0
% Hemlock/Spruce		70.8	65.4	76.7	44.3	40.8	42.0	29.9	0.0
% Spruce		2.5	2.2	7.8	0.2	2.9	1.1	50.3	0.0
% STRATA A		70.4	67.9	73.9	73.1	68.4	41.1	65.9	0.0
% STRATA B		28.0	30.3	18.8	24.2	29.0	42.0	26.5	0.0
% STRATA C		1.6	1.7	7.4	2.7	2.5	15.6	7.6	0.0
% STRATA D		0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0

TABLE 3-77 continued
ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

		Geozone							
Species	Strata	C18	C20	C21	C22	C23	C24	C25	K01
Cottonwood		0	0	180	0	6,308	0	0	0
Unproductive Conifer		32,993	23,343	28,335	0	148,460	0	36,699	12,682
Productive Conifer									
Cedar	A	0	0	0	0	0	0	20	0
	B	0	0	0	0	0	0	0	0
Western and	A	21,713	18,501	33,499	0	59,598	0	36,004	7,402
Mountain	B	15,085	10,427	10,179	0	14,491	0	10,315	40
Hemlock	C	800	2,022	1,199	0	2,257	0	5,324	0
	D	0	0	0	0	0	0	19	0
Hemlock/Spruce	A	3,767	2,603	9,964	0	34,550	0	23,904	1,300
	B	11,374	7,226	12,540	0	39,288	0	70,200	5,601
	C	4,214	4,203	3,661	0	6,247	0	6,326	1,500
	D	0	200	100	0	140	0	356	680
Spruce	A	199	0	320	0	3,093	0	318	0
	B	676	300	300	0	3,448	0	981	0
	C	379	40	80	0	1,200	0	1,042	40
	D	0	20	20	0	0	0	0	0
Total Productive Conifer		58,207	45,542	71,862	0	164,312	0	154,809	16,563
Total Cedar		0	0	0	0	0	0	20	0
Total Hemlock		37,598	30,950	44,877	0	76,346	0	51,662	7,442
Total Hemlock/Spruce		19,355	14,232	26,265	0	80,225	0	100,786	9,081
Total Spruce		1,254	360	720	0	7,741	0	2,341	40
TOTAL STRATA A		25,679	21,104	43,783	0	97,241	0	60,246	8,702
TOTAL STRATA B		27,135	17,953	23,019	0	57,227	0	81,496	5,641
TOTAL STRATA C		5,393	6,265	4,940	0	9,704	0	12,692	1,540
TOTAL STRATA D		0	220	120	0	140	0	375	680
% Cedar		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% Hemlock		64.6	68.0	62.4	0.0	46.5	0.0	33.4	44.9
% Hemlock/Spruce		33.3	31.3	36.5	0.0	48.8	0.0	65.1	54.8
% Spruce		2.2	0.8	1.0	0.0	4.7	0.0	1.5	0.2
% STRATA A		44.1	46.3	60.9	0.0	59.2	0.0	38.9	52.5
% STRATA B		46.6	39.4	32.0	0.0	34.8	0.0	52.6	34.1
% STRATA C		9.3	13.8	6.9	0.0	5.9	0.0	8.2	9.3
% STRATA D		0.0	0.5	0.2	0.0	0.1	0.0	0.2	4.1

TABLE 3-77 continued

ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

		Geozone							
Species	Strata	K02	K04	K05	K06	K07	K08	K09	K10
Cottonwood		0	0	0	0	0	0	0	0
Unproductive Conifer		34,707	174,218	79,557	208,995	118,478	148,964	39,845	43,718
Productive Conifer									
Cedar	A	1,046	2,100	879	7,401	8,519	5,475	476	518
	B	0	80	0	320	160	160	0	0
Western and	A	1,970	76,916	44,537	105,757	42,427	55,271	33,468	30,522
Mountain	B	865	93,785	36,122	91,536	19,629	30,899	22,148	15,178
Hemlock	C	0	9,444	1,301	24,862	2,943	4,440	2,718	1,841
	D	0	80	0	2,177	380	400	100	0
Hemlock/Spruce	A	1,227	4,823	1,901	5,826	2,020	6,653	2,848	958
	B	1,990	34,042	10,119	48,550	14,293	20,863	15,217	3,324
	C	140	11,223	3,579	37,413	14,718	15,738	5,131	1,666
	D	0	820	460	15,054	14,577	12,407	1,016	319
Spruce	A	20	0	0	20	60	320	20	0
	B	80	140	60	420	658	879	419	80
	C	0	141	100	1,461	1,054	1,439	259	60
	D	0	120	0	2,756	1,376	1,821	359	0
Total Productive Conifer		7,338	233,714	99,058	343,553	122,814	156,765	84,179	54,466
Total Cedar		1,046	2,180	879	7,721	8,679	5,635	476	518
Total Hemlock		2,835	180,225	81,960	224,332	65,379	91,010	58,434	47,541
Total Hemlock/Spruce		3,357	50,908	16,059	106,843	45,608	55,661	24,212	6,267
Total Spruce		100	401	160	4,657	3,148	4,459	1,057	140
TOTAL STRATA A		4,263	83,839	47,317	119,004	53,026	67,719	36,812	31,998
TOTAL STRATA B		2,935	128,047	46,301	140,826	34,740	52,801	37,784	18,582
TOTAL STRATA C		140	20,808	4,980	63,736	18,715	21,617	8,108	3,567
TOTAL STRATA D		0	1,020	460	19,987	16,333	14,628	1,475	319
% Cedar		14.3	0.9	0.9	2.2	7.1	3.6	0.6	1.0
% Hemlock		38.6	77.1	82.7	65.3	53.2	58.1	69.4	87.3
% Hemlock/Spruce		45.7	21.8	16.2	31.1	37.1	35.5	28.8	11.5
% Spruce		1.4	0.2	0.2	1.4	2.6	2.8	1.3	0.3
% STRATA A		58.1	35.9	47.8	34.6	43.2	43.2	43.7	58.7
% STRATA B		40.0	54.8	46.7	41.0	28.3	33.7	44.9	34.1
% STRATA C		1.9	8.9	5.0	18.6	15.2	13.8	9.6	6.5
% STRATA D		0.0	0.4	0.5	5.8	13.3	9.3	1.8	0.6

TABLE 3-77 continued
ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

		Geozone							
Species	Strata	K11	K12	K13	K14	K15	S01	S02	S03
Cottonwood		0	0	500	0	0	0	0	0
Unproductive Conifer		41,425	36,872	679,278	47,018	8,762	62,981	23,613	148,172
Productive Conifer									
Cedar	A	1,102	300	2,139	4,018	0	80	0	239
	B	60	0	80	0	0	80	0	0
Western and	A	30,938	20,813	321,464	15,045	8,900	48,916	29,104	62,445
Mountain	B	37,126	16,466	138,034	4,697	7,703	47,751	16,963	25,622
Hemlock	C	11,648	1,081	13,819	520	977	7,544	782	1,360
	D	2,986	0	440	40	60	1,060	0	0
Hemlock/Spruce	A	984	1,181	32,106	439	1,758	9,388	7,810	5,945
	B	10,911	5,127	75,406	3,416	2,354	49,015	16,769	17,450
	C	15,359	600	13,662	2,459	279	17,439	3,694	5,073
	D	7,792	220	4,698	1,160	0	4,961	161	419
Spruce	A	0	0	100	0	0	339	0	20
	B	321	20	480	20	0	917	80	60
	C	281	40	720	239	0	857	60	60
	D	180	0	680	100	0	100	20	0
Total Productive Conifer		119,688	45,848	603,828	32,153	22,031	188,447	75,443	118,693
Total Cedar		1,162	300	2,219	4,018	0	160	0	239
Total Hemlock		82,698	38,360	473,757	20,302	17,640	105,271	46,849	89,427
Total Hemlock/Spruce		35,046	7,128	125,872	7,474	4,391	80,803	28,434	28,887
Total Spruce		782	60	1,980	359	0	2,213	160	140
TOTAL STRATA A		33,024	22,294	355,809	19,502	10,658	58,723	36,914	68,649
TOTAL STRATA B		48,418	21,613	214,000	8,133	10,057	97,763	33,812	43,132
TOTAL STRATA C		27,288	1,721	28,201	3,218	1,256	25,840	4,536	6,493
TOTAL STRATA D		10,958	220	5,818	1,300	60	6,121	181	419
% Cedar		1.0	0.7	0.4	12.5	0.0	0.1	0.0	0.2
% Hemlock		69.1	83.7	78.5	63.1	80.1	55.9	62.1	75.3
% Hemlock/Spruce		29.3	15.5	20.8	23.2	19.9	42.9	37.7	24.3
% Spruce		0.7	0.1	0.3	1.1	0.0	1.2	0.2	0.1
% STRATA A		27.6	48.6	58.9	60.7	48.4	31.2	48.9	57.8
% STRATA B		40.5	47.1	35.4	25.3	45.6	51.9	44.8	36.3
% STRATA C		22.8	3.8	4.7	10.0	5.7	13.7	6.0	5.5
% STRATA D		9.2	0.5	1.0	4.0	0.3	3.2	0.2	0.4

TABLE 3-77 continued

ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

		Geozone							
Species	Strata	S04	S05	S06	S07	S08	S09	S10	S11
Cottonwood		0	0	0	0	0	20	0	0
Unproductive Conifer		34,684	46,441	90,354	46,740	85,950	170,532	76,315	5,589
Productive Conifer									
Cedar	A	0	0	358	0	0	0	80	60
	B	0	0	61	0	0	0	0	0
Western and	A	31,223	31,560	47,489	27,120	37,412	112,693	51,815	9,286
Mountain	B	15,030	11,446	17,896	12,621	14,385	46,328	15,752	21,635
Hemlock	C	3,221	2,178	1,341	780	2,996	1,720	1,681	1,280
	D	80	40	0	0	160	0	40	0
Hemlock/Spruce	A	1,601	3,019	10,979	5,080	19,056	5,420	21,877	758
	B	5,324	4,017	24,352	11,680	23,838	21,722	23,042	11,397
	C	1,501	1,678	3,721	2,100	4,014	3,500	5,048	2,118
	D	60	200	381	20	342	0	340	0
Spruce	A	60	0	40	40	221	100	141	119
	B	20	60	220	0	160	20	481	159
	C	0	20	200	0	62	160	320	60
	D	0	0	60	0	0	0	220	0
Total Productive Conifer		58,120	54,218	107,098	59,441	102,646	191,663	120,837	46,872
Total Cedar		0	0	419	0	0	0	80	60
Total Hemlock		49,554	45,224	66,726	40,521	54,953	160,741	69,288	32,201
Total Hemlock/Spruce		8,486	8,914	39,433	18,880	47,250	30,642	50,307	14,273
Total Spruce		80	80	520	40	443	280	1,162	338
TOTAL STRATA A		32,884	34,579	58,866	32,240	56,689	118,213	73,913	10,223
TOTAL STRATA B		20,374	15,523	42,529	24,301	38,383	68,070	39,275	33,191
TOTAL STRATA C		4,722	3,876	5,262	2,880	7,072	5,380	7,049	3,458
TOTAL STRATA D		140	240	441	20	502	0	600	0
% Cedar		0.0	0.0	0.4	0.0	0.0	0.0	0.1	0.1
% Hemlock		85.3	83.4	62.3	68.2	53.5	83.9	57.3	68.7
% Hemlock/Spruce		14.6	16.4	36.8	31.8	46.0	16.0	41.6	30.5
% Spruce		0.1	0.1	0.5	0.1	0.4	0.1	1.0	0.7
% STRATA A		56.6	63.8	55.0	54.2	55.2	61.7	61.2	21.8
% STRATA B		35.1	28.6	39.7	40.9	37.4	35.5	32.5	70.8
% STRATA C		8.1	7.1	4.9	4.8	6.9	2.8	5.8	7.4
% STRATA D		0.2	0.4	0.4	0.0	0.5	0.0	0.5	0.0

TABLE 3-77 continued
ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

Species	Strata	Geozone S12	S13	S14	TOTALS
Cottonwood		1,780	0	0	8,868
Unproductive Conifer		34,303	20,079	7,171	3,566,317
Productive Conifer					
Cedar	A	0	20	0	34,910
	B	0	0	0	1,001
Western and	A	20,996	9,899	8,346	1,896,186
Mountain	B	10,848	5,637	3,623	993,331
Hemlock	C	1,161	100	200	136,523
	D	20	140	0	8,602
Hemlock/Spruce	A	9,589	1,080	6,030	573,887
	B	18,479	4,980	6,315	972,044
	C	4,824	700	701	295,568
	D	0	140	0	72,579
Spruce	A	1,541	0	100	23,357
	B	1,301	20	501	36,961
	C	1,480	0	341	29,514
	D	0	0	0	9,651
Total Productive Conifer		70,239	22,716	26,157	5,084,114
Total Cedar		0	20	0	35,911
Total Hemlock		33,025	15,776	12,169	3,034,642
Total Hemlock/Spruce		32,892	6,900	13,046	1,914,078
Total Spruce		4,322	20	942	99,483
TOTAL STRATA A		32,126	10,999	14,476	2,528,340
TOTAL STRATA B		30,628	10,637	10,439	2,003,337
TOTAL STRATA C		7,465	800	1,242	461,605
TOTAL STRATA D		20	280	0	90,832
% Cedar		0.0	0.1	0.0	0.7
% Hemlock		47.0	69.4	46.5	59.7
% Hemlock/Spruce		46.8	30.4	49.9	37.6
% Spruce		6.2	0.1	3.6	2.0
% STRATA A		45.7	48.4	55.3	49.7
% STRATA B		43.6	46.8	39.9	39.4
% STRATA C		10.6	3.5	4.7	9.1
% STRATA D		0.0	1.2	0.0	1.8

Source: Revision database, December 19, 1989.

Table 3-78 provides a first approximation of old-growth acres by Society of American Foresters classification of forest cover types. At the present time, it is not possible to identify the acres for the lodgepole pine, coastal true fir/western hemlock, and western red cedar/western hemlock cover types because those species identifiers are not part of the GIS database. The acres for old growth lodgepole pine are included in the unproductive old-growth acres displayed in previous tables. The acres for old growth coastal true fir/western hemlock, and western red cedar/western hemlock are included in the old growth western hemlock and mountain hemlock acres at this time.

TABLE 3-78
FIRST APPROXIMATION OF OLD GROWTH ACRES BY SOCIETY OF AMERICAN FORESTERS CLASSIFICATION OF FOREST COVER TYPES.

Type Number	Cover Type	Acres	Comments
205	Mountain Hemlock	399,892	Includes all old-growth hemlock stands above 1,500 feet elevation: may include acres for types 226 and 227
218	Lodgepole Pine	unknown	Lodgepole pine is not a species identified in the GIS database
223	Sitka Spruce	99,483	Includes all old-growth spruce stands
224	Western Hemlock	2,634,904	Includes all old-growth hemlock stands below 1,500 feet elevation: includes acres for types 226 and 227
225	Western Hemlock/Sitka Spruce	1,914,085	Includes all old-growth hemlock/spruce stands
226	Coastal True Fir/Western Hemlock	unknown	Coastal true fir is a species not identified in the GIS database
227	Western Red Cedar/Western Hemlock	unknown	Western red cedar/western hemlock is not identified in the GIS database
228	Western Red Cedar	35,912	Includes all old-growth cedar stands

Source: Revision database, December 19, 1989.

Yakutat Situation: Timber stand exams indicate that most of the older stands at Yakutat are between 150 to 200 years of age. Defining old-growth as at least 200 years old, the stands at Yakutat would not be considered old growth. The stands also do not exhibit many of the other characteristics of old-growth stands; there are fewer snags and less woody debris than would be expected under old-growth stand conditions. Table 3-79 summarizes the acres of late successional forest at Yakutat.

TABLE 3-79
ACRES OF LATE SUCCESSIONAL FOREST BY SPECIES AND STRATA FOR GEOZONES AT YAKUTAT.

		Geozones			
Species	Strata	C17	C22	C24	Total
Cottonwood		40	0	0	40
Unproductive Conifer		5,984	13,686	24,351	44,021
Productive Conifer					
Cedar	A	0	0	0	0
	B	0	0	0	0
Hemlock	A	11,817	1,222	2,416	15,455
	B	1,401	100	199	1,700
	C	20	0	60	80
	D	0	0	0	0
Hemlock/Spruce	A	560	1,285	861	2,706
	B	5,525	785	5,770	12,080
	C	400	340	419	1,159
	D	0	0	0	0
Spruce	A	1,041	3,742	2,262	7,045
	B	2,360	1,446	3,819	7,625
	C	1,039	7,713	15,383	24,135
	D	0	1,683	1,381	3,064
Total Productive Conifer		24,163	18,316	32,570	75,049
Total Cedar		0	0	0	0
Total Hemlock		13,238	1,322	2,675	17,235
Total Hemlock/Spruce		6,485	2,410	7,050	15,945
Total Spruce		4,440	14,584	22,845	41,869
Total Strata A		13,418	6,249	5,539	25,206
Total Strata B		9,286	2,331	9,788	21,405
Total Strata C		1,459	8,053	15,862	25,374
Total Strata D		0	1,683	1,381	3,064
% Cedar		0.0	0.0	0.0	0.0
% Hemlock		54.8	7.2	8.2	23.0
% Hemlock/Spruce		26.8	13.2	21.6	21.2
% Spruce		18.4	79.6	70.1	55.8
% Strata A		55.5	34.1	17.0	33.6
% Strata B		38.4	12.7	30.1	28.5
% Strata C		6.0	44.0	48.7	33.8
% Strata D		0.0	9.2	4.2	4.1

Source: Revision database, December 19, 1989.

DEMAND

The Tongass's supply of old growth is important for wildlife, biological diversity, natural ecosystems, recreation, scenic and water quality, fish habitat, commercial timber products, and subsistence. Old growth means different things to different people depending on its type, size, and location. Many of the resource environment sections in Chapter 3 of the AMS discuss the use and demand for old-growth forests. These discussions need not be repeated here; they can be read in each of the resource environment sections.

EXISTING DIRECTION

Fifty-nine percent of the Forest is forested land, with 87 percent currently in an old-growth condition. Not all old growth on the Tongass is productive forest land. About 3.6 million acres have no commercial value and will not be managed for timber production. Of the 5.1 million acres of old growth on productive forest land, about 1.5 million acres, or 29 percent, are currently preserved in designated Wilderness areas, National Monuments, and Research Natural Areas. Of the 3.6 million acres of productive old growth not preserved, about 3 million acres are tentatively suitable for timber harvesting on a sustained yield basis. The existing TLMP schedules timber harvesting on about 1.75 million acres of this 3 million.

To help lessen the impact of logging on old-growth dependent wildlife species on LUD 3 and LUD 4 lands, 273,000 acres of commercial forest land was to be retained (not harvested) during the timber rotation. An additional 244,000 acres of commercial forest land was to be managed under extended timber harvest rotations of up to 200 years. These 517,000 acres collectively became known as retention acres. In general terms, LUD 3 areas were to allow an average of 30 percent of the operable old growth to be retained, and LUD 4 areas were to allow an average of 13 percent of the operable old growth to be retained. TLMP did not identify the location of the retention acres; this job was to be accomplished during project NEPA analysis.

There are currently 5 research natural areas (RNA's) on the Forest which preserve examples of several old-growth forest types:

Pack Creek RNA: Established to represent old-growth hemlock/spruce forest types in northern Southeast Alaska.

Cape Fanshaw RNA: Established to represent old-growth Alaska yellow-cedar and western hemlock forests.

Red River RNA: Established to represent the northern range of old-growth silver fir.

Dog Island RNA: Established to represent a small island with the northern limit of Pacific yew and associated unproductive old-growth and low volume mixed conifer old growth in southern Southeast Alaska.

Limestone RNA: Established to represent typical vegetation types common to the Juneau mainland.

Old Tom Creek RNA: Established to represent a cedar/hemlock old-growth forest; also contains riparian spruce old growth.

Additional information on these RNA's is presented in the Chapter 3 section on Research Natural Areas.

RESULTS OF TLMP IMPLEMENTATION

About 92,924 acres of timber have been harvested from 1979 to 1989. In total, about 500,000 acres of land have been harvested on the Tongass. Most of the timber harvesting has occurred in stands with higher volumes per acre, generally over 30,000 board feet per acre. The Timber Section in Chapter 3 provides additional information on timber harvesting. Currently there are 5.08 million acres of productive old growth on the Tongass; adding the 500,000 acres that have been harvested, it is estimated that there were about 5.6 million acres of productive old-growth forest before timber harvesting began.

OPPORTUNITIES AND CONCERNS

1. The public is concerned about the types of old growth remaining on the Forest. Particular concern is expressed for the "high volume" stands and the Sitka spruce stands.

2. The public is concerned about the distribution of the old-growth stands, especially by the time the first rotation is ended.

3. The public is concerned about the fragmentation of old-growth stands. This concern involves the reduction in stand sizes and the isolation of old-growth patches.

4. There is an opportunity to recognize and define different types of old-growth forest.

5. There is an opportunity to gain a better look at the distribution and quantity of the different types of old growth.

6. There is an opportunity to begin gaining a better understanding on the issue of old-growth fragmentation, and how old-growth patch sizes affect the functioning and quality of the old growth. Included in this is the opportunity to gain an understanding of old-growth patch sizes on small islands, and types of resource uses associated with them.

RECREATION

OVERVIEW

RECREATION RESOURCE ENVIRONMENT

Southeast Alaska possesses a remarkable and unique combination of features, including inland waterways with over 11,000 miles of shoreline, mountains, fiords, glaciers, and large or unusual fish and wildlife populations, that provide opportunities for a wide range of excellent outdoor recreation experiences. Many of these opportunities cannot be duplicated elsewhere in North America, or most other places in the world. Southeast Alaska imparts a feeling of vastness, wildness and solitude. While the area is large, resident population is small.

Southeast Alaska measures over 500 miles in length and 120 miles in width. In 1988, approximately 60,000 people resided within the 42,000 square miles of Southeast Alaska. Most of the population (73 percent) lives in the 3 largest cities: Juneau, Ketchikan, and Sitka. The rest of the population is widely scattered throughout the small towns and villages that characterize Southeast Alaska.

The amount of land in Southeast Alaska administered by public agencies is exceptionally high relative to the lower 48 states, but not relative to the remainder of Alaska. The two major agencies, the National Park Service and the Forest Service, administer the largest units of public lands available for outdoor recreation (see Table 3-80).

TABLE 3-80
DISTRIBUTION OF PUBLIC LANDS IN SOUTHEAST ALASKA AVAILABLE FOR OUTDOOR RECREATION

	Type of Area	Acres
Federal:	Tongass National Forest	16,955,945
	National Park System	3,238,604
State:	State Park System	65,463
	State Forests	247,000
	State Wildlife Refuges/ Critical Habitats	8,588
Municipal:	Municipal Parks	3,140
Private:	Commercial Recreation Areas	4

Source: Outdoor Recreation: Alaska SCORP, 1988

While the large acreages of Federal lands are impressive, and contribute greatly to the feeling of vastness and solitude so predominant throughout Southeast Alaska, they are also deceiving in regard to the amount of land area that is actually available and useable for recreation purposes. Because of the steep mountainous terrain, the multitude of wetlands, icefields and glaciers, and heavy vegetative cover, most of the recreation activities that are not related to developed facilities take place along the accessible shorelines, river and stream bottoms, and around the many lakes within the Forest. Some use is made of certain parts of the icefields, and the alpine areas (above tree line) are popular for goat hunting. Road systems, which are available and connected to communities, are also used for recreation purposes, but are very limited, particularly near the larger communities of Juneau, Sitka and Ketchikan. Juneau,

for example, has a total road system of about 140 miles including all city streets.

Roads exist only in proximity to major communities and where timber harvest has taken place. There is no interconnecting highway system between islands or between communities on the mainland. The community road systems are heavily used for access to recreation sites and attractions in local vicinities. Where a road system is accessible by the Alaska Marine Highway System (ferries), independent tourists and local users from other parts of Southeast use the road systems for recreational purposes, primarily hunting.

Because the majority of the Forest is undeveloped (92 percent is unroaded), Southeast Alaska is primarily used for dispersed recreation activities except for the concentrated use areas and facilities, such as visitor centers and campgrounds, located in the vicinity of the communities. Viewing scenery and wildlife, boating, fishing, hiking and hunting are the principal activities participated in by visitors to the Tongass National Forest.

Because recreation use is so dependent on access, the pattern of use associated with known protected boat anchorages, boat landings and aircraft landing sites, and the limited road systems, makes it possible to identify specific "recreation places" which require consideration in both land allocation decisions as well as future project planning. It is these specific places and the quality of the settings that are associated with them that constitute the effective supply of recreation opportunities throughout the Tongass National Forest. As a part of the revision of the Tongass Forest Plan approximately 1,300 recreation places, aggregating nearly 4.8 million acres, have been inventoried. This amounts to 29 percent of the total National Forest. These recreation places can be generally categorized into three attraction types: Marine, Freshwater, and Land.

Marine Recreation

The marine setting dominates most outdoor recreation opportunities. There are 646,000 acres of beach along approximately 11,000 miles of shoreline. The thousands of sheltered waterways, inlets, bays and anchorages provide access (by either boat or aircraft) to most areas of recreation attraction in Southeast Alaska. For the most part, the typical recreationist travels through or flies over the marine environment to participate in nearly all outdoor recreation pursuits. Twenty nine percent (1.4 million acres) of the inventoried recreation places are primarily related to marine recreation opportunities. The community road systems provide the principal access to nearby beaches and bays in a few locations. While the Forest Service manages the upland areas (above mean high tide), jurisdiction over the intertidal lands and the saltwater fishery is exercised by the State.

Except for the limited road systems accessible from communities, almost all outdoor recreation opportunities rely upon marine access. The family boat is used in the same manner as wheeled recreational vehicles are used in other places. The majority of recreation use of marine recreation places originates in local community boat harbors or launching sites on road systems, within about a two hour travel distance by boat. This "home range" for recreation participation is defined by travel times similar to typical highway travel times in the lower 48, although the distance actually travelled is much shorter. (The typical "home range" for boat access is about 15-30 miles.) (Marine Recreation in the Tongass NF, U of Oregon, 1983).

The most popular activities of users visiting marine recreation places are: beachcombing and hiking, fishing, motorboating, clamming and crabbing (Alaska Public Survey, 1983). Other popular activities are hunting onshore and kayaking/canoeing. For overnight users, the most popular activities remain the same with the addition of camping onshore and staying in cabins. However, the location of the "favorite" place to visit is different than for day use trips. While the types of activity patterns are essentially the same at "favorite" and "most often visited" places, the reasons given for why a site is favorite differ in subtle but important ways. Reasons why a place is favorite are remoteness, and various land (setting) characteristics such as beaches, anchorages, and scenery. Reasons given for most often visited places are distinguished by qualities of access, convenience, facilities, and particular activity opportunities (Marine Recreation on the Tongass NF, University of Oregon, 1983).

Freshwater Recreation

Southeast Alaska also abounds in freshwater recreation opportunities. There are approximately 42,000 miles of perennial streams and rivers and over 20,000 lakes and ponds within the Tongass National Forest. Twenty five per cent (1.2 million acres) of the inventoried recreation places are primarily related to freshwater recreation opportunities. Streams and some lakes near communities are accessed by the community road system or a combination of roads and trails. Away from the communities, the freshwater environment quickly becomes remote and is accessible only by air, or in some cases by small power and non-power boats.

Fifty two percent of the identified freshwater recreation place acreage lies within the Primitive Recreation Opportunity Spectrum (ROS) class and 21 percent are within the Semi-primitive Non-motorized class. The Recreation Opportunity Spectrum (ROS) classes identify areas having different recreation settings and experience opportunities. The ROS system is explained more fully later in this section.) The limited system of trails from saltwater to inland lakes and along streams are important for recreation access to these areas. Eighty one of the 145 Forest Service recreation cabins and shelters on the Tongass NF are located on or near freshwater lakes or streams. The "range" of recreation participation is typically limited by either the limits of the available road system or by the distance of the cabins from communities and the related cost of flying to them. (A typical round trip flight for a party of four and their equipment to a lake 30 miles from a community with charter air service runs about $300-$400).

The most sought after settings at freshwater related recreation places are those that provide opportunities for: (1) getting away (solitude), (2) enjoying natural and scenic settings, (3) fishing for a diversity of species and (4) good airplane access (Cabin Survey, etc.).

Land-Related Recreation

Only 2.2 million acres (46%) of the inventoried recreation places are primarily related to land based recreation opportunities. While the 17 million acre size of the Tongass would seemingly present enormous recreation opportunity, relatively little use occurs in areas away from the saltwater shoreline and freshwater bodies because of the inhospitable terrain and difficult access. There are approximately 10 million acres of forested lands, nearly 4.3 million acres of alpine terrain (which contain about 3.75 million acres of icefields and rock) and over 1.5 million acres of muskeg. Some recreation use occurs in all these land areas, but in general access is limited and recreation activity opportunities are restricted by the terrain, dense vegetation, bogs, and other adverse features. Where there are road systems (connected to communities) hunting use occurs and is generally increasing. Where trails are available to access the alpine ridges and mountaintops people use them.

Much of the upland forested areas in Southeast Alaska are in climax condition, or in secondary succession following windthrow, fire, or previous timber harvesting. These forested lands are characterized by dense vegetative cover that greatly discourages cross-country travel and restricts viewing. About nine percent of the land is muskeg, that while much more open is also difficult to travel over. In short, much of the forested upland is not very attractive or directly usable by recreationists. However, the presence of this vast undeveloped area plays a very important role in providing the perceptions of naturalness and remoteness associated with the more defined marine and frewhwater recreation places. Both of these attributes are rated among the top five setting characteristics most desired by the recreation users of the Tongass National Forest (Alaska Public Survey, 1979).

The most popular activities of users of the identified land-related recreation places are hunting, hiking (where there are associated trails), and driving for pleasure (where there are associated roads). The principal setting attributes of these places are access, remoteness from communities and developed sites, availability of parking sites for Recreation vehicles (but without facilities), viewing scenery, exploring little used roads, and freedom of choice of activities. These perceived attributes appear to be much the same on the Tongass NF as in other places in the Pacific Northwest. (The Value of Roaded Multiple Use Areas as Recreation Sites, Clark, et al, 1984).

SOCIOECONOMIC SETTING

Tourism and the Tourist Industry

For a century now, people have been venturing north to experience the scenic beauty of Alaska's Inside Passage. The actual numbers have been up and down, affected by two world wars and major or minor economic depressions and booms. But overall, the tourism industry has grown substantially. The most consistent thread one can follow in the development of the visitor trade in Southeast Alaska has been the persistent demand for the natural scenic beauty of the area. The attraction of wild, unspoiled scenery was evident in the writings of John Muir and others in the late 1800's. The attraction was the same even without the publicity of Glacier Bay in the first half of the twentieth century. And more recently, the Inside Passage has continued to grow in popularity, and has become the "single most highly promoted attraction in all Alaska" (Eric McDowell). It was true in 1879 when John Muir stepped off a mail steamer at Fort Wrangell, and it remains the center focus today as kayakers and cruiseship passengers alike explore the Inside Passage: "What is different about Alaska is, in a word, its wildness. What call tourists is not what western civilization has done, but what it has not done" (L.Bright,1985).

From 1975 to 1983 tourism and recreation use increased by 70-100 percent in Southeast Alaska. Cruiseship visitation increased by 115 percent, ferry system usage increased by 33 percent, and enplaning airline passengers at Juneau increased by 51 percent.

For the same period of time, Forest Service Recreation Information Management (RIM) figures suggest an increase in use of approximately 100 percent on the Tongass as a whole, with 1.4 million Recreation Visitor Days (RVD's) in 1975 and 2.8 million RVD's in 1983. These figures are most useful as a point of reference from which to judge the relative importance of tourism in the Southeast Alaska economy (Bright 1985).

During the summer of 1988 a comprehensive survey of visitors to Southeast Alaska was conducted to measure the economic impact of tourism on the region's economy (Southeast Alaska Pleasure Visitor Research Program, 1988). Among the major findings was that visitors (those arriving for other than work or business) spent about $74 million while in Southeast Alaska, establishing that tourism is Southeast Alaska's third largest "industry".

Some of the insights about the tourist industry gained from that study are described here, and in tables 3-81 through 3-84.

- 87 percent of all arrivals were visitors (369,200).

- Pleasure Visitors can be categorized into two groups -- Vacation/Pleasure visitors comprising 96 percent of all visitors and those "Visiting Friends and Relatives" which comprise the remaining 4 percent of visitors.

- Southeast drew an estimated 70 percent of the entire state's pleasure visitors in the summer of 1988.

- There were 34 percent more pleasure visitors in 1988 than in 1985.

- Pleasure visitors can be broken into two categories: "Package" and "Independent". Those on a pre-sold, pre-arranged trip are called package tour visitors. Independent visitors make their own arrangements and travel around Southeast on their own.

- 96 percent of those visiting friends and relatives and 24 percent of vacation/pleasure visitors are "independent visitors."

- Total independent visitors have increased about 20 percent since 1985.

- 27 percent of all pleasure visitors were independents.

- 53 percent of all independents enter Southeast by personal vehicle; the other half split between ferry (26 percent) and air (21 percent).

- 36 percent of the independents come from the Western U.S. including 16 percent from California. Twenty-four percent of the independent visitors come from Canada.

- 73 percent of the visitors bought full packages of transportation, accommodations and sightseeing. Package visitors increased 40 percent since 1985.

- The average age of the Southeast pleasure visitor is 53.1 years; and 59 percent are over 55 years of age.

- Independent visitors are seven years younger on average than the package visitor (49 vs. 57 years).

- 46 percent of Southeast Alaska visitors are employed, and 45 percent are retired. 10 percent are homemakers, unemployed or minors.

- 54 percent of Southeast Alaska pleasure visitors are women.

Demographics

TABLE 3-81

GEOGRAPHIC ORIGIN OF SOUTHEAST ALASKA PLEASURE VISITORS

Visitor Origin	% of Independent Visitors	% of All Visitors
Alaska	7	2
Western U.S.	36	33
California	16	18
Washington	6	4
Midwest	13	18
South	6	18
East	7	15
Canada	24	10
Overseas	7	4

Source: Southeast Alaska Pleasure Visitor Research Program, 1988, p.59.

TABLE 3-82

LENGTH OF STAY IN LODGING TYPES

Lodging	% of all visitors using this Lodging Type	Average # of Nights for those using this Lodging Type
Cruiseship	67.0	2.5 nights
Hotel/Motel	19.0	1.8
Ferry	13.4	1.7
Recreational Vehicle	7.0	3.4
Private Home	4.8	7.9
Resort/Lodge	2.8	1.7
Developed Campground	2.0	2.9
Boat	1.7	3.6
Bed and Breakfast	1.0	2.7
Undeveloped Camping Area	.8	2.3
Youth Hostel	.5	3.9
Forest Service Cabin	.2	2.3
Designated Wilderness Camping	.3	1.9

Source: Southeast Alaska Pleasure Visitor Research Program, 1988, p. 74.

TABLE 3-83
SUMMARY OF EXPENDITURES BY VISITOR TYPE

	Total Expenditures ($000)	Per Party Trip	Per Party Night	Per Person Trip	Per Person Night
ALL VISITORS	74,000	$490	$132	$223	$60
Entry Mode					
Air	13,509	$765	109	364	52
Cruiseship	40,506	425	142	203	67
Ferry	6,328	635	99	254	40
Highway-PV	8,319	397	128	173	56
Highway-MC	5,225	449	160	236	84
Trip Purpose					
Vacation/Pleasure	69,569	$479	137	218	62
Visiting Family/Rel	4,431	658	75	346	39
Travel Type					
Packaged	52,422	454	146	216	70
Independent	21,465	551	104	240	45
Origin					
Alaska	1,413	$362	68	181	34
West	24,618	477	111	227	53
Midwest	16,654	588	163	280	78
South	12,944	488	139	222	63
East	11,691	483	142	230	68
Canada	3,527	235	107	102	46
Overseas	2,615	449	112	204	51
Activity					
Sightseeing	54,308	$411	128	187	58
Entertainment	624	179	69	78	30
Hiking	365	350	55	159	25
Fishing	3,251	878	144	325	53
Boating	494	464	125	172	66
Visit Frds/Rel	4,271	582	61	291	31
Other	6,306	335	93	134	37

Source: Southeast Alaska Pleasure Visitor Research Program, 1988, Page 84.

TABLE 3-84
PARTY SIZE

Number of Persons per Party	Of all visitors (in percent)
1	13%
2	72
3	6
4	6
5	3

Mean number of persons per party 2.2 (Excludes parties of 10 or more)

Souree: Southeast Alaska Pleasure Visitor Research Program, 1988, p. 74.

Resident lifestyle and Outdoor Reereation Needs

The distance from Alaska to the lower 48 States and other parts of the world (with the exception of Canada) and the associated travel cost is a major factor behind the clear difference between resident recreationists and the visitors described in the survey. The survey indicates that visitors are generally older, often purchase package tours, utilize many relatively expensive services, and spend relatively little time in remote settings while in Southeast Alaska. They travel primarily by ship and by air. This is in contrast with most places in the rest of the United States where the two groups are often much less distinctive (primarily due to motor vehicle travel). Unfortunately, most reporting of recreation use does not separate visitors and residents, making it impossible to distinguish the effects or values of the two groups from existing data. The State, while maintaining reasonably good records about visiting tourists, has no similar studies about resident impacts, values, desires, needs, or the effect of tourism on resident recreation opportunities.

Local residents of Southeast Alaska seem to value highly the opportunities for remote, unerowded wildland and marine outdoor recreation. Most of Southeast Alaska is known for its abundant opportunities to "get away from it all." Many residents take advantage of this fact and frequently head for the wilds to boat, fish, hunt, camp, hike, beachcomb, pick berries, and to do the many other things possible in this vast region. Although the number of residents is small, many residents spend more time out of doors than their counterparts in the Lower 48. Because of the highly dispersed nature of this type of recreation, much of it is inconspicuous and easily overlooked and information about the amount of dispersed use is difficult to obtain. The most recent information available about the recreation habits and effects of the local resident is that obtained during the Alaska Publie Survey which was conducted in 1979. Most of the following information is taken from that source.

It is important to keep in mind the "invisible" character of the dispersed recreation occurring in Southeast Alaska when interpreting the findings of any of the existing surveys or estimates of use. Because of the nature of the geography and jurisdictional patterns in Southeast Alaska, it is assumed that most dispersed recreation takes place on National Forest lands or the saltwater immediately adjacent to National Forest Lands. The available data either underestimates the nature and extent of many recreation activities or

overcompensates in inconsistent ways. The net result is that while there is a general intuitive feeling by many that outdoor recreation opportunities and activities are highly important to residents there is little recent documented evidence to clearly support this intuition.

The 1979 Alaska Public Survey helped substantiate this indication of attachment many residents have for the region (Alaska Public Survey--Residents and Resources, ISER, University of Alaska). To quote from the report:

> "Perhaps the most important findings are:
>
> - The importance of the region's natural resource base in providing an attractive setting in which to live and recreate. We found that, for many, the importance attached to and satisfaction derived from the region's environmental setting overshadowed the economic opportunities that the natural resource base provided. There is little substantial information to collaborate the belief, especially in the case of residents.
>
> - The strong attachment of residents to the region. Southeasterners live in the region longer, are more satisfied with community life there, and are more likely to mention other places in their present region of residence as good places to live than are the residents of Southcentral and Interior Alaska we interviewed.
>
> "Both of these tend to distinguish Southeasterners from other Alaskans we interviewed and explain their great concern with natural resource planning for the region's public lands. Because of their strong ties to the region, they are likely to persevere through considerable economic inconvenience, such as might accompany a major change in the region's economy, before they would move elsewhere. Many expressed an interest in pursuing another line of work if necessary to remain in the region."

The same 1979 survey indicated that by and large the residents of Southeast Alaska felt the Forest Service was doing a good job of managing the Tongass National Forest (56 percent), and was doing an excellent job of providing recreation opportunities. They were less pleased with the stewardship of the timber harvesting and salmon stream management. In 1988, a poll done for the Sealaska Corporation indicated that an increased majority (69 percent) felt the Forest Service was doing a good job, but had the same concerns about an imbalance between timber harvest and wildlife and recreation management.

Between 1967 and 1979 resident recreation "demand" changed significantly. The population increased about 1/3 and demand for recreation opportunities followed. There was also an increase in the per capita participation rate. The average southeastener spent twice as much time kayaking, motorboating, snowmobiling (though there is a limited supply), and cross-country skiing. This indicates a growing interest in these activities, much the same as in the rest of the United States during the same period of time. On the other hand, the rising cost of energy seemed to have little effect on the amount of dispersed recreation participation, although, for the first time the cost of pursuing recreation opportunities (boating and flying) was frequently mentioned as a barrier to participation. As the cost of access to recreation opportunities and places becomes more of a barrier to participation, the location of available sites and places become more important. Outside of "lack of time" and "weather", the most

significant "barrier" to participating in recreation activities was stated to be insufficient places accessible from their communities for dispersed recreation. (In 1967, the lack of facilities was the most mentioned problem, which seemed to have been alleviated by 1979.) Other barriers mentioned frequently were "equipment cost" and "need for better information about how and where to go."

A sizable number of residents in 1979 indicated they would stop going to their favorite place if any of a number of development related activities took place there. The two most detrimental changes that people feared would take place were (1) more people (crowding), and (2) new logging activities.

Tables 3-85 and 3-86 indicate the activities participated in by southeast Alaska residents in 1978-79.

TABLE 3-85
MOST POPULAR OUTDOOR RECREATION ACTIVITIES IN SOUTHEAST ALASKA -- 1978-79

(Average annual participation days per capita by Southeastern Alaska adult residents in 1978-79.)

Activity	Annual Days Per Capita	Rank Per Capita Days
Walking, running for pleasure	44	1
Driving for pleasure	27	2
Hiking, beachcombing	25	3
Motorboating	24	4
Playing outdoor sports and games	22	5
Fishing	16	6
Bicycling	6.8	7
Camping	6.1	8
Hunting	4.7	9
Spectator sports	4.5	10
Canoeing and kayaking	3.8	11
Swimming, scuba diving	2.2	12
Summer ORV travel	2.1	13
Sledding, tobaggoning, sailing, winter ORV travel	1.7	14,15,16
Flying		
Downhill Skiing	1.6	17,18
Cross-country skiing	1.3	19
Horseback riding, hang gliding, golf	less than 1	

Source: Alaska Public Survey, Residents and Resources, ISER, University of Alaska, 1979.

TABLE 3-86
SOUTHEAST ALASKAN RESIDENT RECREATION TAKING PLACE ON THE COAST

Activity	% of days on the coast
Motorboating	89
Kayaking, canoeing	74
Sailing	Data not sufficient to calculate
Fishing	80
Clamming, crabbing	100
Hunting 1/	79
Camping	34
Swimming	64
Hiking, beachcombing	89
All dispersed recreation 2/	75%

Source: (Alaska Public Survey - Residents and Resources, ISER, University of Alaska, 1979.)

1/ Assumes all deer and waterfowl hunting is coastal, all other noncoastal.
2/ Includes above activities summer and winter off-road vehicles, travel, flying, cross-country skiing, all of which are assumed to be noncoastal.

Changes in Southeast Alaska Resident Recreation Patterns

Several factors influence total resident recreation demand in a region. Three important ones, regional population, per capita participation, and recreation travel behavior, are discussed below.

Regional Population. As a region's population increases, so too should the demand for recreation opportunities in the region. If the pattern of recreation (i.e., the where, when, and how much time is devoted to each activity) remains constant, the increase should be essentially proportional. In the five decades since 1930 the population of Southeast Alaska has increased more than 20 percent per decade except during World War II. Between 1967 and 1979 the region's resident population increased by about a third to approximately 60,000 people. In the past decade the State as a whole experienced a significant boom/bust economic shift triggered by the world pricing of oil, timber and fish; all highly important resource commodities produced in the State and in the case of the latter two, Southeast Alaska in particular. The result has been a sharp rise and fall of resident population to a point about equal to the population of 1979. The prognosis for the next decade is for the population of Southeast Alaska to show a slow increase.

Per capita participation. The pattern of people's recreation changes through time; because of this, recreation demand projections are more than simply population projections. Table 3-87 highlights changes in per capita participation by Southeast Alaska residents between 1967 and 1979.

TABLE 3-87
CHANGES IN THE WAYS SOUTHEAST ALASKANS ENGAGED IN ACTIVITIES: 1967-1979

	% change in average annual per capita days	Absolute change in Average Annual per capita days
ACTIVITIES SHOWING INCREASES		
Snowmobiling	1530%	+ 1.6
Canoeing	529	+ 3.2
Cross-country skiing	317	+ 1.0
Motorboating	149	+12.2
Snow play	144	2.0
Downhill Skiing	114	0.8
Camping	110	3.3
Bicycling	88	6.3
Walking, running for pleasure, hiking, and beachcombing	52	+14.7
ACTIVITIES REMAINING THE SAME		
Hunting	*	
Fishing	*	
Flying	*	
Playing outdoor games and sports	*	
ACTIVITIES SHOWING DECREASES		
Driving for pleasure	-23	-8.2
Outdoor swimming	-33	-2.2

Source: Alaska Public Survey - Residents and Resources, ISER, University of Alaska, 1979.
*"Statistical uncertainty in average annual per capita participation days for specific activites is typically 5 to 15 percent for both 1967 and 1979 data, but ranges higher for less frequently engaged in activities. With these uncertainties, we can only say that change in these activities, if any, has been small (20 percent over 12 years). We cannot quantify that change more precisely." (Alaska Public Survey, Residents and Resources, ISER, University of Alaska, 1979>)

Some of the most popular activities (i.e., hunting, and fishing) exhibited no significant change. Eight activities, snowmobiling, canoeing, cross-country skiing, motorboating, snowplay, downhill skiing, camping and bicycling, experienced increases exceeding 50 percent in the 12-year period. While there is statistical uncertainty about the nature of these changes and the methods used to measure them, it does appear that the significant changes can be collaborated by actual observation and that they are largely attributable to decisions to engage in these activities instead of other outdoor recreation activities previously enjoyed. Overall, this shift or substitution appears to favor dispersed, nonconsumptive recreation activities: those requiring a large land or water base per recreationist. This may be indicative of the relative decrease of these

opportunities for uncrowded and highly scenic settings elsewhere in the country and many foreign countries.

Over time, the supply of certain recreation opportunities in Southeast Alaska has increased: road systems have expanded, the number of Forest Service recreation cabins and other facilities has increased, and visitor services and tourism marketing have increased. The advent of the ATV is playing an important role in how local residents view the construction and management of roads (i.e., there is a strong desire to allow continued use of ATVs for hunting and fishing.) In some cases, supply-induced increases in participation have occurred. This appears to be the case on Prince of Wales and Mitkof Islands where road systems developed for timber harvesting purposes created an opportunity for road-related access to previously inaccessible recreation settings and an opportunity for recreation activities involving wheeled vehicles (something that was relatively rare in those parts of Southeast Alaska). Use increased, but existing capacity now is greater than demand and it would be erroneous to project additional need or to claim a recreation benefit from additional roads unless, or until, demand again exceeds the supply.

Supply-induced participation changes have also been accompanied by additional demand for land areas (places) or facilities for a related activity. With increased opportunities for roaded access and activities on Mitkof and Prince of Wales Islands came the need for fisherman parking, campgrounds, picnic sites, trails to scenic attractions, and additional short access routes to cabin sites and previously inaccessible beaches. Increased tourism has resulted in increased demand for visitor facilities, interpretive services, and walking and hiking opportunities near the major communities.

There is evidence that changes in outdoor recreation opportunities in Southeast Alaska are both demand-induced (following more nationwide trends toward dispersed, nonconsumptive recreation activities and settings which enhance opportunities for solitude, wildlife viewing, hiking and beachcombing, and "just getting away"), and supply-induced (usually on a more local level and related to community or transportation infrastructures).

The Southeast Alaska data seems to show that for the most part people are not turning away from energy-intensive recreation activities, although there seems to be a rising concern about the costs of accessing desired places. Public scoping indicates a desire from many people to have more hiking trails and other dispersed recreation opportunities made available close to communities, and the concern that those communities within normal travel distances be protected from adverse change. And there is a part of the population in each of the communities that do not have the financial capability to travel beyond the range of the local road system for outdoor recreation purposes, including fishing.

ALASKA STATE COMPREHENSIVE OUTDOOR RECREATION PLAN

The general belief of the State of Alaska is that outdoor recreation can be the synthesis of conservation and development. To quote from the State Comprhensive Outdoor Recreation Plan (SCORP):

State-wide Overview

"Conservation, because certain portions of the most extensive wilderness remaining in the United States can be preserved to provide permanent opportunities for wilderness experiences, and because the areas and facilities to be developed for more intensive recreational use can be kept compatible with the esthetic attributes of the environment.

"Development, because outdoor recreation is a major aspect of economic development, involves large capital investments, and will increase in importance as a major source of income to the Alaskan economy."

The Alaska Outdoor Recreation Plan, besides expressing the outdoor recreation needs of those who use Alaska's recreational resources, is designed to be an element of the Alaska Comprehensive Development Plan, and close liaison is maintained with the Division of Planning and Research. Responsibility for outdoor recreation planning is assigned to the Alaska Department of Natural Resources by Alaska Statutes: Public Resources, Section 41.20.020, which gives the Department legal authority to:

- Develop a continuing plan for the conservation and maximum use in the public interest of the scenic, historic, archaeologic, scientific, biological, and recreational resources of the State.
- Plan for the development of a system of State Parks and recreational facilities, to be established as the legislature authorizes and directs.
- Cooperate with the United States and its agencies and local subdivisions of the State to secure the effective supervision, improvement, development, extension, and maintenance of State Parks, State Monuments, State Historical areas, and State recreational areas, and secure agreements or contracts for the purpose of sections 10 through 40 of this chapter.
- Provide for consulting service designed to develop local park and recreation facilities and programs.
- Provide clearing-house services for other State agencies concerned with park and recreation matters.

Specifically the State's Goals are:

- To provide outdoor recreation opportunities for Alaska's residents and visitors which are conveniently located, well maintained, and safe. Opportunities to appreciate Alaska's history and diverse cultures should be provided to aid the physical and mental health of a competitive society.
- To preserve the high quality of the Alaskan environment which is the mainstay of Alaska's outdoor recreation.
- To provide for economic development through tourism by maintaining Alaska as an attractive visitor destination of international significance.

Southeast Alaska Regional Overview

SCORP addresses the recreation needs of the State on a region by region basis. Southeast Alaska, perhaps more so than any of the other regions in the State, is an entity in and of itself. Tourists quite often visit both Southeast and the Southcentral and Interior parts of the State, but because of the restricted transportation connections with the northern parts of the State there is currently not a great deal of interchange of resident users (at least from north to south). Therefore, only the Southeast regional aspects of the SCORP will be addressed here.

Because of the abundance of Federal land currently or potentially available for recreation in Southeast, only five new areas, marine parks encompassing 5,144 acres, are recommended for inclusion into the State Park System by the regional planning process (see Table 3-88). Nevertheless, there is a need for expanded

recreational opportunities within the region, particularly at the community level where recreation land availability is scarce. Only 1 percent of the lands (194,428 acres) proposed to be classified "public recreation" according to regional land use plans are located in the Southeast Region.

Southeast Alaska has 12 percent of the population and enjoys 9 percent of the State's facility capacity for outdoor recreationists. The SCORP estimates that overall, the demand for facilities exceeds the supply by about 15 percent on peak use days. Southeast Alaska recreation facilities are shown in Table 3-89.

The SCORP indicates the greatest current outdoor recreation facility need is for an additional 338 miles of walking, running and hiking trails, of which 253 miles should be located within communities. This activity in Alaska has the highest rated participation rate in the Nation and lack of sufficient trail miles within a community is common.

TABLE 3-88
PROPOSED ADDITIONS TO THE STATE PARK SYSTEM AND STATE PUBLIC RESERVES

Area	Number of Acres
Grindall Island	515
Point Higgins	70
Virgin Bay	480
Menessee Anchorage	450
Sulzer Portage	1,400
Hole in the Wall	500
Salmon Bay	170
Thoms Lake/Thoms Place	2,568
Mitkof Island	1,500
Petersburg Creek	2,800
Thomas Bay	1,500
Big Bear/Baby Bear Bays	640
Magoun Islands	760
Cape Bingham	1,112
Funter Bay addition	800
Swanson Harbor	1,095
Cross Douglas Trail	1,240
Portland Island	150
Couglan Island	200
Point Bridgett	2,758
Southeast Subtotal	20,708

Source: State Comprehensive Outdoor Recreation Plan, 1988.

TABLE 3-89
DISTRIBUTION OF OUTDOOR RECREATION FACILITY CAPACITY IN SOUTHEAST ALASKA

Type of Facility	Number of Facilities	Capacity of Facilities
Outdoor living		
Picnic units	248	1,240
Sheltered picnic units	35	350
Camps Units	341	1,364
Group Camp Units	17	340
Public Use Cabins	171	855
Trails (Miles)		
Walk/Run	301	1,506
Cross-country ski	88	1,051
Horse/Pack Animal	21	103
Bicycle	13	260
Summer ORV	12	145
Winter ORV	17	170
Winter Sport		
Alpine Ski Areas	2	1,550
Ski Lifts and Tows	0	0
Sled/luge areas, hockey rinks, speed skating ovals, other outdoor skating	0	0
Water Sport		
Outdoor Swim Areas	0	0
Kayak/Canoe/Raft Miles	49	294
Boat Launch Facilities	19	76
Game & Activities		
Tennis	24	96
Basketball	28	280
Volleyball	1	20
Soccer and Football Field	6	132
Softball & Baseball Fields	37	666
Track and Field	16	1,600
Playgrounds	88	14,400
Golf Courses	0	0
Target Ranges	16	0
Miscellaneous Facilities		
Hist and Arch Sites	31	
Wildlife Viewing Areas	11	
Lodges/Hostels	3	
Visitor Centers	6	
Community Centers	7	
Road miles	13	
Parking Spaces	2,698	
Drinking Water	43	
Latrines	219	

Source: State Comprehensive Outdoor Recreation Plan, 1988.

Alaska Public Survey Recommendations

The Alaska Public Survey made several recommendations which have implications for management. Among the more important recommendations are (Alaska Public Survey, Residents & Resources, 1980):

1. The continuing apparent increase in participation in dispersed recreation activities will put increasing demands on the Forest Service to accommodate this demand. The nature of the activities experiencing the greatest growth in popularity means the most immediate need for accommodating this growth is in managing suitable areas in a way that will not detract from their value for recreation. Facility development will become less important.

2. The increasing concern with the cost of access to dispersed recreation places, due in part to the high cost of fuels, will increase the demand for nearby areas. As energy costs increase, locational factors should receive more emphasis than site factors.

3. Recreationists are very sensitive to development activities in the vicinity of favored destinations for overnight trips (see Tables 3-90 and 3-91). Currently, crowding and logging are the two most important changes detracting from their enjoyment. This points to the need to avoid resource developments near favored places lest further recreation pressure be placed on unaffected recreation destinations.

TABLE 3-90
SENSITIVITY TO CHANGE AT FAVORITE COASTAL RECREATION PLACES OVERNIGHT

Change	% Responding that Change would make Place "Less Attractive"	% Responding That Change would make Them "Stop Going There"	% Already Noticing Change There
Clearcuts	80.3%	37.4	15.4
New houses or buildings	80.2	42.0	14.4
New logging	77.4	40.9	20.7
New roads	77.1	34.6	10.0
Mine tailings	76.5	32.2	13.6
Log Storage	75.9	33.9	11.1
More recreationists	73.0	32.9	42.2
Offshore Oil drilling	72.0	41.4	7.1
Airplanes and helicopters	45.2	15.5	37.8
Shipping traffic	43.3	16.0	22.5
Commercial fishing (boats and gear)	21.8	11.4	41.2

Source: State Comprehensive Outdoor Recreation Plan, 1988.

TABLE 3-91
SENSITIVITY TO CHANGE AT FAVORITE COASTAL RECREATION PLACES

Characteristic of Favorite Place	% Responding that this characteristic very important or important	Sensitivity to change index* of those responding "very important or important"
Good plane access	28	57.3
Good boat access, moorage	75	60.5
Road access	18	68.0
Cabins available	31	61.2
Good saltwater fishing	72	62.3
Good clamming, crabbing	53	69.2
Good beachcombing, hiking, or walking	75	69.5
Good opportunity to view wildlife and birds	84	69.0
Good hunting	44	63.0
Undisturbed natural areas	79	74.0
Scenery	88	70.5
Good place to get away from others	91	70.2

Source: State Comprehensive Outdoor Recreation Plan, 1988.
*Index is the average of percents responding that each of 11 specific changes could make their favorite recreation place "less attractive."

4. Because future shifts in the demand for recreation activities can only very imperfectly be projected, resource agencies should err on the side of caution in preserving suitable lands from changes that would diminish the value of such lands for recreation for very long periods of time. "Latent" demand should be used to guide recreation improvement programs. (Note: Latent demand is that existing unmet demand that planners and managers could provide for in the future by removing those barriers to participation that are frustrating its satisfaction and over which the agency has some control.)

SUPPLY/INVENTORY DISPERSED RECREATION PLACES

The following are descriptions of the specific recreation places used in the planning process to identify the opportunities for dispersed outdoor recreation activities and experiences.

Primitive

These places provide the primitive recreation opportunities and experiences of unroaded areas (both inside and outside Wilderness). These areas are characterized by an extensive unmodified natural environment. They provide a high probability of opportunities for independence, closeness to nature, and self-reliance in an environment that offers a high degree of challenge and risk. Interaction between users is very infrequent and evidence of other users is minimal. Motorized use within the area is limited to boat, aircraft and snowmachines. Non-motorized travel is usually cross-country, utilizing natural waterways, or on constructed trails. All resource management activities are

integrated in such a way that evidence of current human use, including subsistence activities, leaves no permanent or long-lasting impression.

Of the 4.8 million acres of Recreation Places inventoried 2.5 million acres (52 percent) fall in the Pristine (P1) and Primitive (P2) Recreation Opportunity Spectrum Class areas of the Forest. (Please see the Recreation Opportunity Spectrum discussion later in this section for explanations of these terms.) Sixty-nine percent of the primitive recreation place acres lie on five Ranger Districts. Admiralty Island and Misty Fiords National Monument/Wildernesses account for 43 percent and the Juneau, Craig, and Petersburg Ranger Districts account for 26 percent.

Table 3-92 shows the distribution of Recreation Place acreage by ROS class across the Tongass National Forest.

TABLE 3-92
RECREATION PLACES BY ROS CLASS

ROS Class	Percent of Total Recreation Places	Acres
Primitive 1	30%	1,467,179
Primitive 2	22%	1,036,009
Semiprimitive Non-Motorized	21%	1,013,039
Semiprimitive Motorized	17%	823,343
Roaded Natural	2.8%	133,644
Roaded Modified	7%	336,931
Rural/Urban	0.2%	8,661

Source: Query 227a.

Semi-primitive

These places provide semi-primitive recreation opportunities and activities such as snowmobiling, high-clearance vehicle driving or use of all terrain vehicles and motorcycling on trails and primitive roads and areas designated appropriate for these activities. The use of small motorboats on remote lakes and streams is also included. In areas which are inaccessible to motorized vehicles or boats, or are officially closed to the use of motorized vehicles, the setting is considered a semi-primitive non-motorized ROS class. Such activities and opportunities are made available away from areas of concentrated development and human activity, and from heavily used waterways.

These areas are characterized by a predominantly natural or natural-appearing environment. They provide a moderate to high probability for experiencing independence, closeness to nature, and self-reliance in an environment that offers a high to moderate degree of challenge in traveling and operating motorized vehicles or boats. User concentrations are low, but there is often evidence of recent past use by other users. Evidence of past management and use, such as historical remains of early mining and logging, may be present. These may or may not be visually subordinate to the surrounding landscape, but appear to have evolved to their present state through natural processes. Current

resource management activities are not visually evident or are subordinate to the characteristic landscape.

Over 1.8 million acres (38 percent) of the inventoried recreation place acreage lies within the Semi-primitive Motorized ROS class (1.04 million acres) and the Semi-primitive Non-motorized ROS class (823,000 acres). Fifty-eight percent of these acres are on the Chatham Area, 17 percent on the Ketchikan Area, and 24 percent on the Stikine Area. Juneau, Sitka, Wrangell, and Hoonah Ranger Districts all have significant acreages of Semi-primitive opportunities.

Roaded

These sites provide Roaded Natural, Rural, or Roaded Modified ROS opportunities associated with both motorized and non-motorized activities such as driving for pleasure, viewing scenery, picnicking, fishing, beachcombing, snowmobiling, hiking, and cross-country skiing. Such activities occur within 1/2 mile of highways and roads maintained open for conventional passenger vehicles or principal motorized waterways. Other resource management activities or structures are often readily evident, may be dominant, but harmonize and blend with the generally natural-appearing environment. Interaction between users may be moderate to high with evidence of other users prevalent. Facilities and roads are designed for conventional motorized vehicles.

Ten percent or 478,000 acres of the inventoried recreation places offer roaded recreation opportunities. Juneau, Sitka, Petersburg, and Thorne Bay Ranger Districts all have significant acreages of roaded recreation opportunities.

Trails

The Tongass National Forest manages 464 miles of trails. Considering the size of the Forest, trail access is much more limited than most other national forests. Only 56 miles of trail are managed in the 5.4 million acres of designated Wilderness, for a very low trail density of only one mile of trail for every 156 square miles.

Trails facilitate access through the Forest or to specific sites and attractions. Most trails in Southeast Alaska are primarily for hiking, with a few for cross-country skiing during periods of snow cover. A few are suitable for mountain bike travel. Most trails which cross muskeg or other wetlands are constructed boardwalks or turnpike trails designed to keep the traveler above the water-saturated ground.

Many of the trails begin at points near the community road systems and may be managed by a variety of federal, state or community agencies. Trails vary in length from a few hundred feet to several miles. There are many different experiences available along these trails ranging from the alpine of the mountaintops to the old-growth forests along stream bottoms or shorelines. Trail corridors are maintained to provide the established ROS settings designated for given segments of a trail.

Table 3-93 shows the distribution of Forest Service trails, trail mileages, and estimated use across the Tongass National Forest.

TABLE 3-93
TRAILS ON THE TONGASS

AREA/DISTRICT	NUMBER OF TRAILS	TOTAL MILES	MILES IN WILDERNESS	1987 EST. USE
CHATHAM				
Admiralty NM	13	21.6	21.6	3,300 RVD
Hoonah RD	1	5.6	--	5,600 RVD
Juneau RD	24	81.8	--	31,400 RVD
Sitka RD	25	57.9	4.2	13,400 RVD
Yakutat RD	7	20.7	3.7	(incl. w/Juneau)
Sub Total	70	187.6	25.3	53,900 RVD
KETCHIKAN				
Craig RD	5	6.3	--	500 RVD
Ketchikan RD	21	56.0	--	8,500 RVD
Misty Fiord NM	15	39.8	14.9	3,500 RVD
Thorne Bay RD	11	49.1	--	1,600 RVD
Sub Total	52	151.2	14.9	14,100 RVD
STIKINE				
Petersburg RD	30	67.3	15.3	5,900 RVD
Wrangell RD	13	18.8	0.8	4,400 RVD
Sub Total	43	86.1	16.1	10,300 RVD
TONGASS NF TOTAL	165	424.9	56.3	78,300 RVD

Source: R-10 RIM Trails data and Forest Area reports to WO, 1987

Trails are one of the most popular recreation facilities, and public input indicates a strong desire for more developed trails, particularly near communities. They are also expensive to build and maintain. Costs run between $20,000 and $85,000 per mile depending upon the location and amount of boardwalk or other special construction needed to cross wet areas. Yet, without trails, access to other recreation attractions and opportunities is severely limited.

Anchorages

Safe and functional anchorage locations are highly desirable and attractive sites in an area where most activities revolve around marine-based outdoor recreation and transportation. Often the principal attribute that determines whether or not a section of coastline receives any use at all depends upon the availability of a suitable anchorage. The necessary attributes of an anchorage are: protection from winds, currents, and wave action; sufficient depth to allow for tidal fluctuations and room for one or more boats to swing safely while at anchor; an adequate holding bottom (mud/sand); absence of, or protection from, shoals and debris; adequate forested cover to provide privacy and wind protection; and access to landing site for a small boat.

Approximately 535 recreation places are directly associated with anchorages on the Tongass. These are often one of the principal attractions which induce use of the surrounding upland setting. Other resource uses of bays which contain good anchorages or the crowding of known anchorages are the basis for many potential or existing conflicts arising from the allocation of resources in the Forest Plan.

Cabins/Shelters

These sites provide shelter to forest users at specified locations throughout the Forest. The two most common types of cabins are A-frames and Pan-Abode. Each can sleep at least four to six people, (a few have larger capacities). Cabins are located throughout the range of ROS classes, except Rural and Urban. Access is usually by floatplane at lakes and saltwater locations, by boat at saltwater locations, and a few by road or landing strips. Those cabins accessible by saltwater also require adequate anchorages. Many involve a short to medium hike by trail from the principal access point. Each site includes a toilet and firewood storage area. Some also have small skiffs provided. All are available to the public on a reservation basis.

Shelters are three-sided Adirondack style, with a usual capacity of four people, and include a toilet. Some also are provided with a small skiff.

All cabin and shelter sites are encompassed by an area that is maintained to protect the established ROS classification of the site.

There are 145 Forest Service recreation cabins and shelters on the Tongass National Forest, and a small number of cabins owned by the State of other agencies. The Forest's cabin program is one of the most popular recreation opportunities available in Southeast. Some are available year around and some for only portions of the year, but usually for at least six months. All cabins are made available to the public through a reservation system. Some, in areas with highly popular fishing or hunting seasons, are allocated through a lottery system. Although use accounting is done differently between Forest Areas, it appears that the average annual occupancy rate is between 40 percent and 65 percent. Demand is so high at some locations, or at certain times of the year, that some cabins or groups of cabins are managed through a lottery system.

Recreation places with specific kinds of sites are listed in table 3-94.

TABLE 3-94
SUMMARY OF RECREATION PLACES CONTANING SPECIFIC KINDS OF SITES

CHATHAM AREA — RANGER DISTRICT

KIND OF SITE	YRD	SRD	HRD	JRD	ANM
1. No. of Recreation Places on the Chatham Area	93	526	98	386	378
2. No. of Recreation Places having existing Recreation Sites	28	143	13	69	22
3. No. of existing Rec. Sites (developed and disperse- incl. anchorages)	79	199	31	135	119
4. No. of Rec. Places with following kind of Rec. Sites					
a. Campgrounds	0	4	2	3	0
b. Picnic Grounds	3	5	0	3	0
c. Cabins	17	20	1	13	12
d. Shelters	0	1	0	1	0
e. Trails	6	41	0	37	13
f. Anchorages	7	110	17	39	13
g. Buoys	0	1	1	1	0
h. Docks/Ramps	7	0	0	3	0
i. Visitor Centers	0	0	0	1	0
j. Hot Springs	0	4	0	0	0
k. Airfields	15	0	0	3	1
l. Observation Sites	0	1	0	1	1
m. Information Site	0	0	0	1	0

KETCHIKAN AREA — RANGER DISTRICT

TYPE OF SITE	CRD	TRD	KRD	MISTY
1. No. of places having sites	82	136	76	41
2. No. of existing sites (developed and disperse- incl. anchorages)	108	199	105	62
3. No. of places with following kind of sites				
a. Devel. fac. of any type	16	36	45	27
b. Campgrounds	0	5	1	0
c. Picnic grounds	0	3	4	0
d. Cabins	6	13	12	10
e. Shelters	1	0	5	4

TABLE 3.94 (Continued)

f. Trails	6	15	29	18
g. Anchorages	69	95	36	21
h. Buoys	0	0	6	8
i. Docks	2	4	5	1
j. Ramps	0	3	2	0
k. Visitor centers	0	1	1	1
l. Hot springs	0	0	1	0

STIKINE AREA	RANGER DISTRICT	
TYPE OF SITE	WRD	PRD
1. No. of Recreation Places	---	---
2. No. of Recreation Places having existing Recreation Sites	100	104
3. No. of existing Rec. Sites (developed and dispersed incl. anchorages)	202	189
4. No. of Rec. Places with following kind of Rec. Sites		
a. Campgrounds	1	1
b. Picnic Grounds	1	3
c. Cabins	17	19
d. Shelters	0	0
e. Trails	15	30
f. Anchorages	66	62
g. Buoys	2	1
h. Docks/Ramps	7	8
i. Visitor Centers	0	0
j. Hot Springs	1	0
k. Airfields	3	0
l. Observation Sites	3	6
m. Information Site	1	0

(Note: Above figures under #3. represent the number of Rec. Places containing different Rec. Sites, not the total number of each of these facilities.)

CONCENTRATED RECREATION PLACES

The following are descriptions of the specific recreation places used in the planning process to identify the opportunities for concentrated outdoor recreation activities and experiences.

Visitor Centers

The Mendenhall Glacier Visitor Center located on the Juneau Ranger District near the city of Juneau is the only site of this type located on the Tongass National Forest. The center overlooks Mendenhall Lake and the Mendenhall Glacier. The site consists of parking and sanitation facilities in conjunction with an elaborate visitor center containing exhibits and a theater. Two interpretive trails of one and two miles each are a part of the complex.

The visitor center was designed to accommodate 25,000 annual visitors. When it opened in 1962, use exceeded 30,000 the first year and has grown continually since. In 1988 more than 185,000 people visited the center making it the second-most-visited site in Alaska. (The first is its sister visitor center at Portage Glacier on the Chugach National Forest). The State Department of Transportation highway count indicates that more than 800,000 people visited the Mendenhall Visitor Center/Lake/Glacier complex in 1988. The Mendenhall Recreation Complex plays an important role in both the quality of life of the Juneau resident, and for the tourist industry in Southeast Alaska.

Along with the Mendenhall Visitor Center, the Juneau Ranger District also operates a visitor center at Centennial Hall in downtown Juneau. This facility provides not only information concerning the National Forest and centralized cabin reservation services but information about all the outdoor recreation opportunities for State and National Parks and Municipal parks throughout the Southeast region. Centennial Hall Visitor Center receives about 50,000 visits annually.

The Forest Service is currently participating in the design and development of the Southeast Alaska Visitor Information Center (SEAVIC) in Ketchikan with a branch site in the native community of Hydaburg on Prince of Wales Island. SEAVIC will be located in downtown Ketchikan. It is designed to work in conjunction with the proposed City of Ketchikan Museum on a shared site. SEAVIC will have approximately 21,000 square feet of interior space, with a greater proportion of this dedicated to program and exhibits. The exhibits will feature natural history and cultural history associated with public lands in Southeast Alaska. The center is designed to service approximately 400 people per hour with visitors circulating through the exhibits, viewing programs in the auditorium, researching travel plans in a trip planning area or participating in hands-on activities in a discovery area. SEAVIC will be one of four Alaska Public Lands Information Centers in Alaska authorized by ANILCA, and is a cooperative effort between local, federal and state agencies. Planning and design monies to develop the center were contributed by the State of Alaska and the USDA Forest Service (total $530,000). The Forest Service is the lead agency in planning, design and development of SEAVIC while working with a 15 member interagency planning committee. Planning and design of the building will be completed in the summer of 1990. Exhibit planning will not be completed until construction funding is available.

The Hydaburg Information center is to be a satellite to SEAVIC, located at Hydaburg on Prince of Wales Island. Funding to initially start the planning and conceptual design for the center was appropriated in fiscal year 1990 ($50,000). The Forest Service will be the lead agency for this project and will work in

conjunction and cooperation with the various local, state and federal agencies in this effort.

Interpretive Sites These are sites usually consisting of small to medium-sized parking areas and/or viewing areas with signs and other media used to aid the visitor in interpreting natural history, cultural history, places of ecological interest or wildlife viewing areas.

There are approximately 16 developed interpretive sites on the Forest. Interpretive sites operated by the State or Municipalities are usually related to cultural resources or fish production and located in or adjacent to the communities.

Campgrounds Campgrounds are sites specifically located and designed to accommodate visitors wishing to camp overnight within the Forest. Sites include a few to many developed campsites, sanitation facilities, parking areas and interior roads. Other attributes include interpretive trails, boat docks, playground facilities, and picnic sites.

There are 12 developed campgrounds on the Forest with a combined capacity of 970 persons-at-one-time (PAOT). Each of these campgrounds are kept open from May through September and maintain an occupancy rate of 45 percent to 55 percent during the peak part of the year. Independent visitors with their own vehicles, and bicyclists or backpackers, traveling for the most part by ferry utilize these campgrounds. Those with associated picnic facilities and fishing opportunities also receive use from local communities. Although they are used to capacity often during peak travel seasons, there seems to be no pressing need for additional campground capacity on the Tongass National Forest. As more visitors travel with recreation vehicles on the Marine Highway there appears to be a demand for RV parking in or nearby communities. The ultimate growth in RV-equipped visitors is dependent upon the capacity of the Marine Highway ferries.

The State Park System operates one campground (Settler's Cove) and one interpretive site (Totem Bight) in the Ketchikan area which were formerly National Forest campgrounds, but are on lands conveyed to the State. The RV parking sites are usually managed by the Municipal Parks Departments.

Picnic Areas Sites specifically located and designed to accommodate family groups or group picnic areas for organizations.

There are 23 developed picnic sites with a combined capacity of 850 PAOT. These sites play an important role in local community lifestyles. With the long summer evenings and pleasant weekends families and friends gather often at these facilities to socialize and enjoy the outdoor settings.

Table 3-95 shows the distribution of concentrated recreation sites on the Tongass National Forest.

TABLE 3-95
DISTRIBUTION OF CONCENTRATED RECREATION SITES BY ADMINISTRATIVE AREA

TYPE OF SITE	CHATHAM AREA	KETCHIKAN AREA	STIKINE AREA
Campgrounds	4 (570 PAOT)	7 (305 PAOT)	1 (75 PAOT)
Picnic Sites	8 (400 PAOT)	10 (275 PAOT)	5 (75 PAOT)
Recreation Cabins	66	63	44
Pvt. Recreation Residences (under SUP)	9	3	43
Lodges (under SUP)	2 (17 PAOT)	1 (6 PAOT)	0

PAOT = persons at one time
SUP = special use permit

Ski Area(s)

These are sites developed specifically for downhill skiing. They have ski lifts, day lodges, parking and sanitation facilities for large groups of people. They may also include an adjoining system of cross-country trails which may be groomed and use regulated. The only currently existing downhill ski area in Southeast Alaska is Eaglecrest at Juneau (located on City and Borough land which was conveyed from the National Forest).

There is latent demand for downhill skiing opportunities is each of the communities, but the population levels and travel constraints between communities make financially feasible areas questionable. There are opportunities near most of the communities to provide access to cross-country skiing terrain through the use of logging or mining roads, or on trails. For dependable snow conditions, elevations generally need to be above 800 to 1,000 feet. Snowmobiling opportunities are also possible on road systems at higher elevations.

Wildlife and Fish Observation Areas

There are designated sites that are specifically managed to provide the public an opportunity to view wildlife in a manner that is appropriate and safe both from the people's standpoint and that of the wildlife. They may or may not have developed facilities.

There are several of these sites on the Forest and a potential for several more, particularly in cooperation with local fish and wildlife groups and the Alaska Department of Fish and Game (ADF&G). Wildlife viewing is a rapidly growing attraction for visitors to an area and can be an asset to local tourist economies. However, there must be a careful equilibrium achieved between creating opportunities to view birds, marine mammals, bears, and other wildlife, and creating stressful or dangerous situations. Wildlife viewing opportunities often carry with them the need for closer regulation and management than do other outdoor recreation activities. The institution of the limiting permit system at the Pack Creek bear viewing area on Admiralty Island is a case in point. The

ADF&G is currently conducting a local study to determine the extent and importance of wildlife viewing to the outfitter/guide industry.

Other Developed Facilities and Service Centers

These sites may be lodges or resorts, or other sites that have been specifically developed to accommodate groups of people for primarily outdoor recreation purposes.

Currently there are only three small resorts with a combined capacity of 23 PAOT on National Forest lands. There are several resorts on private land throughout the Southeast region. All are small operations that provide fishing, hunting and wildlife viewing opportunities for their guests. There is potential for this type of use to increase, and requests for additional special use permits to be issued both on National Forest and State lands.

Tour Boat Routes

These are saltwater routes consistently used by commercial tour boats (and in some cases the Alaska Marine Highway System) to access and view land areas of the National Forest located in the visual foreground and middleground areas as seen from the saltwater. These affected land areas are not inventoried as recreation places, unless there is also associated use on the land, but they are sensitive viewing areas and are inventoried using the visual resource management system criteria.

These routes may change in some local areas due to marketing strategies by competing tour companies. But for the most part the principal routes remain the same. Viewing scenery is the principal reason for visiting Southeast Alaska cited by two thirds of the visitors interviewed in 1988. (SAPVRP 1988)

EXISTING DIRECTION

Existing Direction and Guidance for Providing and Managing Outdoor Recreation Opportunities.

The direction and authority to provide outdoor recreation opportunities on National Forest lands and waters primarily come from the Term Permit Act of 1915 (38 stat. 1101, amended: 16 U.S.C. 497), the Multiple Use Sustained-Yield Act of June 12, 1960 (74 Stat. 215, as amended: 16 U.S.C. 528-531), the 1964 Wilderness Act (16 U.S.C. 1131-1136), the National Historic Preservation Act of 1966 (P.L. 89-665; 80 Stat. 915; 16 U.S.C. 470 et seq.), the Forest and Rangeland Renewable Resources Planning Act (RPA) of 1974, as amended by the National Forest Management Act (NFMA) of 1976, and described in 36 CFR 219 and FSM 1920. The specific requirements of recreation resource planning are set forth at 36 CFR 219.21.

Forest Service Manual

Chapter 2300 of the Forest Service Manual was rewritten and up-dated in 1986. The policies and objectives, while generally carried over from previous direction, were updated to reflect legislative amendments to basic laws, and new technology and findings from the growing bank of information about the nature of outdoor recreation and wildland recreation management. Therefore the national direction, cited below, was not the same as when TLMP was written.

Recreation management, because of the nature of recreation itself, is more socially oriented than other Forest Service resource activities. The product, recreation experience, is a personal value, but one with a variety of societal benefits such as reduced stress, improved productivity, health, learning, and family solidarity. Consequently, recreation targets, goals, and direction are more difficult to describe in precise terms, since they deal with people's experiences, their perception of those experiences, and the quality of those experiences. The object is quality, not quantity (FSM 2300). Most monitoring of recreation focuses on quantity of use, and with the exception of some research

studies, the Forest has obtainied limited information about the perceived quality of experiences.

National Direction and Policy

Recreation opportunities on National Forests should respond to demonstrated national public needs for natural-resource-based outdoor recreation as well as local or regional public needs. Often, no precise distinction can be drawn. However, it is clear that each level of government has the responsibility to provide for its citizens. National responsibility must be based on how well the nation is served, and whether the activity or program helps solve national social problems or needs (FSM 2300).

The Forest Service responsibilities and opportunities are further distinguished from those of other suppliers by the size of the land base. For the most part, and in the long run, only the Federal estate will be able to provide opportunities for unconfined outdoor recreation free from the urban influence. Such special opportunities must be maintained for future generations. This is the principal feature that sets National Forest recreation apart from most other suppliers, since the converse, highly modified and/or artificial environments, can be supplied by many. Therefore, National Forest recreation will focus primarily on activities which require a large land base and provide a contrast to urbanization (FSM 2300).

The National Recreation Strategy, while not management direction, affirmed the Forest Service's intent to seek partnerships with the private sector and other public agencies in providing public services, to provide greater consideration of urban, handicapped and other "non-traditional" visitors in planning and management of recreation, and to achieve a high level of "customer satisfaction" by providing quality recreation opportunities in the National Forests and actively marketing them.

Recreation Planning Objectives and Policies

Recreation planning on National Forest System lands is an integral part of Forest land and resource management planning (FSM 2310). The objective of recreation planning is to inventory, analyze, and propose levels and types of uses to meet the Nation's outdoor recreation needs as established through RPA program and assessment, regional guides, and forest plans. Specific objectives of recreation resource planning include:

1. Inventory existing and potential recreation opportunities, determine future need for those opportunities, analyze the issues and current management situation, and propose management activities to integrate the recreation needs of the public into planning for other resource needs.
2. Collect, store, use and distribute recreation resource inventory data to better manage the resource and keep the using public and resource managers aware of the scope and diversity of the Forest Service recreation program.
3. Coordinate with other Federal, State, and local agencies, and the private sector in order to avoid competition with the private sector, duplication of recreation facilities and programs, and land-use conflicts.

Specific policies (from FSM 2310.3) include:

1. The use of the Recreation Opportunity Spectrum (ROS) to establish planning criteria, generate objectives for recreation, evaluate public issues, integrate management concerns, project recreation needs and demands, and coordinate management objectives.

2. Use the ROS system to develop standards and guidelines for proposed recreation resource use and development.
3. Use the ROS system guidelines to describe recreation opportunities and coordinate with other recreation suppliers.
4. Recognize that individual National Forests need not (and perhaps, cannot) provide recreation opportunities in each ROS class.

RECREATION OPPORTUNITY SPECTRUM

Nationally the Forest Service uses the concept of the Recreation Opportunity Spectrum to aid in the definition, delineation, and integration of outdoor recreation opportunities in land and resource management planning. Recreation integration/coordination provides for integrated management prescriptions and associated standards and guidelines to deal with the setting characteristics essential to the utilization and enjoyment of the recreation resource. The ROS system defines six basic recreation opportunity classes that provide different settings and experience opportunities for use by the public. The system provides for some modification of the basic classes to better fit the unique or significant characteristics of a given National Forest. In the Alaska Region the ROS has been modified to reflect the needs of water and air transportation to remote areas and the related legislative direction contained in ANILCA.

The following eight pages contain several tables describing and summarizing the Recreation Opportunity Spectrum classes and characteristics for the Tongass National Forest. These tables are collectively identified as table 3-96 (which includes tables 1A, 1b, 1c, 3, 5 and 7), and include descriptions of ROS setting characteristics, activity opportunities, experience opportunities, remoteness criteria, human evidence criteria, and managerial setting criteria.

TABLE 3-96

RECREATION OPPORTUNITY SPECTRUM CLASSES AND CHARACTERISTICS

TABLE 1A

ROS Setting Characteristics*

Primitive I	Primitive II	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Roaded Modified	Rural	Urban
Area is characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls. Motorized use within the area is not permitted.	Area is characterized by essentially unmodified natural environment of fairly large size. Interaction between users is very low and evidence of other users is minimal. The area is managed to have minimum human-induced restrictions and controls. Facilities are provided primarily for user health and safety. Motorized use within the area is permitted but does not commonly occur.	Area is characterized by a predominately natural or natural-appearing environment of moderate-to-large size. Interaction between users is low but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is not permitted.	Area is characterized by a predominately natural or natural-appearing environment of moderate-to-large size. Concentration of users is low but there is often evidence of other users. The area is managed in such a way that minimum on-site controls and restrictions may be present but are subtle. Motorized use is permitted.	Area is characterized by predominately natural-appearing environments with moderate evidences of sights and sounds of man. Such evidences usually harmonize with the natural environment. Interaction between users may be low-to-moderate but with evidence of other users prevalent. Resource modification and utilization practices are evident but harmonize with the natural environment. Conventional motorized use is provided for in construction standards and design of facilities.	Area is characterized by predominately modified natural environment. Resource modification and utilization practices are common and are primarily for specific purposes other than recreation. Vegetative cover is substantially modified. Sights and sounds of humans are readily evident and the interaction between recreating and working users may be high. Facilities are not normally provided. Conventional motorized use may be provided for in construction standards and design of facilities.	Area is characterized by substantially modified natural environment. Resource modification and utilization practices are to enhance specific recreation activities and to maintain vegetative cover and soil. Sights and sounds of humans are readily evident and interaction between users is often moderate-to-high. A considerable number of facilities are designed for use by a large number of people. Facilities are often provided for special activities. Moderate densities are provided for away from developed sites. Facilities for intensified motorized use and parking are available.	Area is characterized by a substantially urbanized environment, although the background may have natural-appearing elements. Renewable resource modification and utilization practices are to enhance specific recreation activities. Vegetative cover is often exotic and manicured. Sights and sounds of humans, on-site, are predominant. Large numbers of users can be expected, both on-site and in nearby areas. Facilities for highly intensified motor use and parking are available with forms of mass transit often available to carry people throughout the site

*This table is for descriptive purposes only. Use the specific ROS class delineation criteria in Table 2 to identify the actual areas to which these descriptions apply.

TABLE 3-96 (Continued)
RECREATION OPPORTUNITY SPECTRUM CLASSES AND CHARACTERISTICS

TABLE 1b

ROS Activity Opportunities*

Recreation Activities	(See BLM Handbook for Activity definitions)	BLM Code	Primitive I	Primitive II	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Roaded Modified	Rural	Urban
-										
-										
Viewing Scenes, Activities & Objects										
	Viewing Scenery	1.1	x	x	•	x	•	x	•	
	Viewing Activities (Spectator)	1.3					x	•	•	x
	Viewing Works of Humankind	1.4					x	•	x	x
Travel - Land, Air and Water										
	Automobile	11.1				x	•	•	x	•
	Motorcycles and Scooters	11.2				x	x	x	x	x
	Ice and Snow Craft	11.3		x		x	x	•	•	
	Specialized Land Craft (ATV's)	11.4				x	x	x	x	
	Train and Bus Touring	11.5					x	x	x	•
	Tour Boat, Ship, Ferry	12.1				•	x	•	•	•
	Boat, Powered	12.2		•		•	•	x	•	x
	Aircraft, Motorized	13.1		x		•	•	•	•	x
	Aerial Trams and Lifts	13.2		x		x	•	x	x	•
	Aircraft, Non-Motorized,	13.3					x	x	x	
	Hiking and Walking	14.1	x	x	x	x	•	•	•	•
	Bicycle	14.2					•	x	x	•
	Horseback Riding	14.3	x	x	x	x	•	x	x	•
	Canoeing (& other light paddle-craft)	15.1	x	x	x	•	x			
	Sailing	15.2	•	x	x	x	•	x	•	•
	Other Watercraft, Non-Motorized	15.3	x	x	•	x	x	x	•	•
Sports/Games										
	Team Sports	21.1							•	•
	Individual Sports	21.2							x	•
	Games and Play	21.3	x	x	•	•	x	•	x	•
Water Sports and Play										
	Swimming and Waterplay	22.1	•	•	•	x	•	•	x	x
	Diving	22.2		•		•	x	x	x	
	Waterskiing and other Water Sports	22.3				x	x	x	x	
Fishing										
	Cold Water Fishing	31.1	x	x	x	x	x	x	x	
	Salt Water Fishing	31.3	x	x	x	x	x	x	x	
	Ice Fishing	31.3	x	x	x	x	x	x	x	

TABLE 3-96 (Continued)

RECREATION OPPORTUNITY SPECTRUM CLASSES AND CHARACTERISTICS

TABLE 1b
(Continuation)

Recreation Activities (See RIM Handbook for Activity definitions)	RIM Code	Primitive I	Primitive II	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Roaded Modified	Rural	Urban
Camping									
General Day Camping	41.1	x	x	x	x	x	x	x	
Automobile Camping	41.2				x	x	x	x	x
Trailer Camping	41.3					x	x	x	x
Tent Camping	41.4	x	x	x	x	x	x	x	
Organization Camping, Day	41.5					x	x	x	
Organization Camping, Night	41.6					x	x	x	
Picnicking	43.1					x	x	x	x
Lodging and Accommodations									
General Resort & Commercial Public Service	46.1								
Resort Lodging			x		x	x	x		
Recreation Cabin Use			x		x	x			
Winter Sports									
Ice Skating	51.1					x	x	x	x
Sledding, Tobogganing	51.2							x	x
Downhill Skiing	51.3		x**		x**	x	x	x	x
Snow Play	51.4					x	x	x	x
Cross-Country Skiing, Snowshoeing	51.5	x	x	x	x	x	x	x	x
Hunting (Including Trapping)									
Big Game Hunting	61.1	x	x	x	x	x	x		
Small Game Hunting	61.2	x	x	x	x	x	x		
Upland Bird Hunting	61.3	x	x	x	x	x	x		
Waterfowl Hunting	61.4	x	x	x	x	x	x		
Nature Study									
Nature Study (Wildlife, Birds & Fish)	62.1	x	x	x	x	x	x		
Nature Study (All Other)	62.2	x	x	x	x	x	x	x	
Mountain Climbing	63.1	x	x	x	x	x	x		

* These Activity opportunities are generally associated with the setting characteristics of each ROS class.

** Heli-skiing opportunities.

TABLE 3-96 (Continued)
RECREATION OPPORTUNITY SPECTRUM CLASSES AND CHARACTERISTICS

TABLE 1b
(Continuation)

Recreation Activities	(See RIM Handbook for Activity definitions) RIM Code	Primitive I	Primitive II	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Roaded Modified	Rural	Urban
Gathering Forest Products	64.1		x	•	•	•	•	•	
Interpretive Activities									
Viewing Interpretive Exhibits	81.1							•	•
Attending Talks and Programs	81.2							x	•
Touring, Guided	81.3					•	•	•	•
Touring, Unguided	81.4					•	•	•	•
Walking, Guided	81.5							x	
Walking, Unguided	81.6					•	•	•	
Viewing Interpretive Signs	81.7					•	•	•	x
Listening to Audio Programs	81.8							•	•
General Information	81.9							•	•

TABLE 3-96 (Continued)
RECREATION OPPORTUNITY SPECTRUM CLASSES AND CHARACTERISTICS

TABLE 1c

ROS Experience Opportunities*

Primitive I	Primitive II	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Roaded Modified	Rural	Urban
Extremely high probability of experiencing isolation from the sights and sounds of humans independence, closeness to nature, tranquility and self-reliance through the application of woodsmen and outdoor skills in an environment that offers a high degree of challenge and risk.	Extremely high probability at most times of experiencing isolation from the sights and sounds of humans and tranquility. Isolated instances of sights and sounds of humans prevalent. Independence, closeness to nature, tranquility and self-reliance through application of woodsman and outdoor skills in an environment that offers a high degree of challenge and risk at all times.	High but not extremely high probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility and self-reliance through the applicaiton of woodsmen and outdoor skills in an environment that offers challenge and risk.	Moderate probability of experiencing isolation from the sights and sounds of humans, independence, closeness to nature, tranquility and self-reliance through the application of woodsmen and outdoor skills in an environment that offers challenge and risk. Opportunity to have a high degree of interaction with the natural environment. Opportunity to use motorized equipment while in the area.	About equal probability to experience affiliation with other user groups and for isolation from sights and sounds of humans. Opportunity to have a high degree of interaction with the natural environment. Challenge and risk opportunities associated with more primitive type of recreation are not very important. Practice and testing of outdoor skills might be important. Opportunities for both motorized and non-motorized forms of recreation are possible.	Little opportunity for isolation from sights and sounds of humans. Numerous opportunities to interact with examples of utilization of the forest resources. Challenge and risk opportunities are not normally important. Opportunities for both motorized and non-motorized forms of recreation are possible.	Probability for experiencing affiliation with individuals and groups in prevalent as is the convenience of sites and opportunities. These factors are generally more important than the setting of the physical environment. Opportunities for wild-land challenges, risk-taking and testing of outdoor skills are generally unimportant except for specific activities like downhill skiing, for which challenge and risk-taking are important elements.	Probability for experiencing affiliation with inndividuals and groups is prevalent as is the convenience of sites and opportunities. Experiencing natural environments, having challenges and risks afforded by the natural environment and the use of outdoor skills are relatively unimportant. Opportunities for competitive and spectator sports and for passive uses of highly human-influenced parks and open spaces are common.

* These experience opportunities are highly probably outcomes of participating in recreation activities in specific recreation settings.

TABLE 3-96 (Continued)

RECREATION OPPORTUNITY SPECTRUM CLASSES AND CHARACTERISTICS

TABLE 3

Remoteness Criteria

Primitive I	Primitive II Non Motorized	Semi-Private Motorized	Semi-Private Natural	Roaded Natural	Roaded Modified
An area generally greater than 3 miles from all roads; railroads, system trails with motorized use or readily accessible marine travelways; greater than 1/4 mile from less accessible marine travelways, aircraft landing sites, (land or water), recreation cabin sites, or system trails with no motorized use.	An area generally; less than 1/4 mile from from low use trails* without motorized use, less accessible marine travelways, recreation cabin sites, or aircraft landing sites (land or water).	An area generally greater than 1/4 mile and less than 3 miles from all roads, railroads, trails with motorized use, or readily accessible marine travelways; less than 1/4 mile from high use trails** without motorized use.	An area generally less than 1/4 mile from primitive roads, trails with motorized use, or readily accessible marine travelways.	An area generally less than 1/4 mile from better-than-primitive roads or railroads.	An area generally less than 1/4 mile from evidences of humans* other than transportation facilities.

Rural

No distance criteria.

* Trails with fewer than 6 encounters per day, on the average.
** Trails with 6 or greater encounters per day, on the average.

* See Sec. 21.23

Note: The criteria can be modified to conform to natural barriers and screening, or other relevant features of local topographic relief and vegetative cover. This fits the criteria to the actual Forest landscape.

TABLE 3-96 (Continued)

RECREATION OPPORTUNITY SPECTRUM CLASSES AND CHARACTERISTICS

TABLE 5

Evidence of Humans Criteria

Primitive, I & II	Semi-Primitive Non-Motorized	Semi-Primitive Motorize	Roaded Natural	Roaded Modified	Rural	Urban
Setting is essentially an unmodified natural environment. Evidence of humans would unnoticed by an observer wandering through the area.	Natural setting may have subtle modifications that would be noticed but not draw the attention of an observer wandering through the area.	Natural setting may have moderately dominant alterations but would not draw the attention of motorized observers on trails and primitive roads within the area.	Natural setting may have modifications which range from being easily noticed to strongly dominant to observers within the area. However from sensitive travel routes and use areas these alterations would remain unnoticed or visually subordinate.	Natural setting is substantially modified by resource modification and utilization practices for other than recreation purposes. Vegetative cover is substantially modified. Sights and sound of humans are readily evident and the interaction between recreating and working users may be high.	Natural setting is culturally modified to the point that it is dominant to the sensitive travel route observer. May include pastoral, agricultural, intensively managed wildland resource corridors. Pedestrial or other slow moving observers are constantly within view of culturally changed landscape.	Setting is strongly structure dominated. Natural or natural-appearing elements may play an important role but be visually subordinate. Pedestrian and other slow moving observers are constantly within view of artificial enclosure of spaces.
Evidence of trails is acceptable, but should not exceed standard to carry expected use.	Little or no evidence of primitive roads and the motorized use of trails and primitive roads.	Strong evidence of primitive roads and the motorized use of trails and primitive roads.	There is strong evidence of designed roads and/or highways.	There is strong evidence of designed roads and/or highways.	There is strong evidence of designed roads and/or highways.	There is strong evidence of designed roads and/or highways.
Structures are extremely rare.	Structures are rare and isolated.	Structures are rare and isolated.	Structures are generally scattered, remaining visually subordinate or unnoticed to the sensitive travel route observer.	Structures incidental to non-recreation uses can be anticipated.	Structures are readily apparent and may range from scattered to small dominant clusters including power lines, microwave installations, local ski areas, minor resorts and	Structures and structures complexes are dominate, and may include major resorts and marinas, national and regional ski area, towns, industrial sites.

TABLE 3-96 (Continued)

RECREATION OPPORTUNITY SPECTRUM CLASSES AND CHARACTERISTICS

TABLE 7

Managerial Setting Criteria

Primitive I & II	Semi-Primitive Non-Motorized	Semi-Primitive Motorized	Roaded Natural	Roaded Modified	Rural	Urban
On-site regimentation is low with controls* primarily off-site.	On-site regimentations and controls* present subtle.	On-site regimentation and controls for non- but subtle.	On-site regimentation and controls* are noticeable, but harmonize with the natural environment.	On-Site regimentations and controls for non-recreation ends are noticeable and influence recreation users.	Regimentation and controls obvious and numerous, largely in harmony with the man-made environment.	Regimentation and controls* obvious and numerous.

*Controls can be physical (such as barriers) or regulatory (such as permits).

Regional Guide Goals

The Alaska Regional Guide provides specific goals to aid policy implementation. The recreation goals are:

1. Increase the supply of outdoor recreation opportunities and services through programs that emphasize dispersed recreation.
2. Encourage development of available private land for provision of resorts, marinas, campgrounds, and other commercial public services.
3. Give priority to recreation facilities that encourage energy and economic efficiency by making National Forest recreation sites more accessible to communities or service centers, or promote sites that are served by public transportation.
4. Increase fee collections for campgrounds, cabins, and other special accommodations or services to reduce competition with the private sector and to recover more of the operation and maintenance costs.
5. Promote Forest service cooperation with Federal, State, local, and private entities to avoid duplication of effort; ensure that National Forest recreation opportunities complement recreation opportunities on state and private lands.
6. Provide visitor orientation on the safe use of National Forests, emphasizing energy conservation and environmental quality.

Direction

The recreation direction is:

1. Identify, designate, and manage the recreational resource of the National Forest for the greatest public benefit, considering national, Regional, and local needs.
2. Provide a broad spectrum of recreation opportunities in accordance with identified needs and demands. Use the Recreation Opportunity Spectrum (ROS) framework to inventory, provide planning input, manage, and monitor recreation opportunity. Use recreation improvements to facilitate dispersed recreation.
3. Use recreation opportunities identified through the Recreation Opportunity Spectrum (ROS) inventory in Forest Plans. Give primary consideration to those recreation opportunities now being actively utilized by the public for recreation pursuits. Retain other identified opportunities to the extent possible.
4. Inventory and evaluate the visual resource as an integrated part of the Forest planning process, addressing both the landscape's visual attractiveness and the public's visual expectation. Assign adopted visual quality objectives (VQO's) through the Forest land management plan process to direct management practices for all definitive land areas.
5. Enter into cooperative ventures with the State (i.e., State Comprehensive Outdoor Recreation Plans), local groups, Native corporations, and other Federal agencies to aid in providing a balanced spectrum of recreation opportunities and to minimize unwarranted duplication of effort.
6. Direct private or commercial recreational developments to private lands to the extent possible. Commercial recreation developments will continue to be permitted on National Forest Systems lands where, consistent with land management plans, there is a demonstrated public need met and benefit derived from such services, and no private lands are available or suitable for development.
7. Incorporate in Forest land management plans proposals for recreational classifications that include significant portions of representative vegetative landform types.

8. Designate, as part of the National Recreation Trail System, those land and water-based trails that have significant recreation values.
9. Identify and protect areas that possess unusual environmental, educational, recreational, and scientific values for public study, use, or enjoyment, lake and stream systems suitable for backpack, raft, and canoe trips; and rivers suitable for extended trips. Particular attention will be given to those areas of national or international significance.
10. Include off-road vehicle use in Forest Land Management Plans and implement off-road vehicle use to minimize adverse effects on the land and resources, promote public safety, and minimize conflicts with other uses of Alaska National Forest System lands. Classify areas and trails as to whether this use is permitted in Forest Plans. For subsistence purposes, snowmobiles, motorboats, and other means of surface transportation traditionally employed for such purposes by local residents, subject to reasonable regulation.
11. Recognize and protect lands having special values, such as boat anchorages, small boat routes, ferry and cruiseship routes, recreation beaches, popular deer hunting areas, wildlife observation areas, sport-fishing streams, scenic byways, and trails as part of the lands management planning process.
12. (Direction pertained only to the Chugach NF)
13. Promote the design, operation, and maintenance of marine-related facilities, such as a proposed system of marine "parks" throughout the Pacific Northwest, British Columbia and Southeast Alaska. A cooperative effort with others, including State and other agencies, is required. Locate and establish roads and trails necessary to provide reasonable access to recreational attractions and to simple dispersed campsites, where planning indicates this is an objective.
14. Use volunteers and cooperative manpower programs to the fullest extent possible to increase the level of maintenance.
15. Use interpretive services to promote energy and economic efficiency and to inform residents and visitors of recreational opportunities and management practices within the National Forest System by:
    a. Reviewing and managing existing facilities to ensure that only those facilities that can provide quality, energy, and economically efficient service are retained or expanded;
    b. Assisting the public in utilization of safe, enjoyable, energy-efficient recreation opportunities.
    c. Assisting future management by increasing public understanding of complex issues involved in managing a working forest.
16. Work with government and private interests to develop specific means and programs including, where feasible, naturalist personnel to serve the interests of cruiseship and State ferry travelers for the purposes of providing enrichment experience as to the nature, use, and values of the natural resources and cultural heritage of Alaska. Develop audiovisual and other programs that emphasize the cost-effectiveness and reduce emphasis on the need for staffing or high-cost facilities.
17. Schedule resource development activities in areas that will not adversely impact currently utilized and other important recreation and visual resources to the extent possible.
18. In areas where Forest Plans have indicated that primary emphasis is on commodity production, minimize adverse impacts on the recreation and visual resources of the area. Provide recreation opportunities where feasible and compatible with other resource objectives. Protect important visual values without significant decrease in commodity outputs by full utilizations of implementation measures available to meet adopted visual quality objectives established as a result of the Forest planning process.

19. Work with other agencies on programs for improving the knowledge base involving recreation supply and demand.
20. Locate new recreation facilities to utilize public transportation systems and facilitate energy-efficient forms of recreation uses.
21. Implement management actions that result in increasing receipts, to recover more of the operation and maintenance costs of charge sites and reduce competition with the private sector.
22. Recognize that recreation use radiates from communities and service centers: encourage private land and capital to develop services and accommodations to meet demands. Complement this development by facilitating the use of the dispersed recreation opportunities in a radiating pattern from these service centers.
23. Implement "no trace" woodsmanship and "pack-it-in/pack-it-out" programs for all dispersed recreation visitors.

Tongass Land Management Plan (as Amended)

Management direction in the Tongass Land Management Plan consists of goals, anticipated outputs, land allocations, Forest-wide standards and guidelines, and more or less specific direction for 141 management areas.

Goals. The goal for recreation is to provide a broad spectrum of recreation opportunities with emphasis on maintaining natural areas with the highest wildlife, sport fish, and dispersed recreation assets.

The goal for tourism is to improve recreation facilities and attractions near communities for the use of visitors to Southeast Alaska by managing these areas with a high degree of protection for their natural attractive features while developing access and required recreation facilities.

A related goal for the visual resource is to maintain the scenic qualities of the most highly viewed landscapes on the Forest by managing many of these areas in ways which would not modify them significantly. In those areas where management activity will take place, projects will be designed to be compatible with the natural elements of the visual resource.

These goals are intended to provide appropriate recreation opportunities for both resident and non-resident recreation publics. For example, the improvement of recreation facilities to accommodate increasing tourism would also be oriented to satisfy local recreation needs.

Plan Outputs. Increasing reliance on the fishing and tourism industries for additional employment opportunities is considered likely under the current Forest Plan. More than half of the Forest is expected to remain basically unmodified over time if the current land use designations remain the same. The average annual recreation and wilderness use was expected to be as follows:

Output	Average Annual Output Range	1986 Reported Use
Dispersed Recreation Use. . . .	282,000 -- 705,000	1,709,100 *
Developed Recreation Use. . .	2,049,000 -- 4,910,000	213,100 *
Wilderness Use.	151,000 -- 171,000	587,400

* Wilderness Use is also included in these numbers
(R-10 RIM)

Land Allocation. The Forest was allocated to one of four Land Use Designations (LUDs). The minimum unit of allocation was the Value Comparison Unit (VCU), typically 30,000 acre watershed. The current inventory of recreation "places" indicates that the VCU is too large an area for effective allocation of lands with specific recreation values and that a more definitive system of allocation is needed to adequately portray the intent of management in these "places". In addition, the description of activities permitted within LUD III and LUD IV provide insufficient detail on how important recreation values are to be managed during the implementation of other resource activities such as timber harvesting. The recreation-related management implications for each of the LUD's are as follows (see also Table 3-97):

LUD I (Wilderness): Areas designated by Congress in 1980 under ANILCA. Hunting, fishing and trapping are permitted, subject to State regulations. Scientific studies designed to enhance the wilderness resource may be conducted. A limited number of new public use cabins may be built where necessary to protect public health and safety. Public use of snowmachines, motorboats, and airplanes is permitted; however, restrictions may be imposed on a case-by-case basis if such use becomes excessive. Wildlife habitat activities designed to enhance the wilderness resource may be permitted, and fish habitat enhancement activities are permitted in accordance with the Regional Salmon Plan. Commercial Outfitter and Guide operations which are compatible with wilderness values may be permitted.

LUD I (Variations):
(a) Areas released from Wilderness consideration by Congress. The Forest Plan and its 1985-86 Amendment indicate that these lands are to be managed to preserve their present character until they are considered in the Revision.

(b) Non-wilderness National Monument lands. These lands, although not subject to the provisions and requirements of the National Wilderness Preservation System, are managed to protect objects of ecological, cultural, geological, historical, prehistorical, and scientific interest. Harvesting of timber and construction of roads is not permitted except as necessary to allow for the development of minerals on established valid claims. These activities are managed and regulated in accordance to the respective approved operating plans for the Greens Creek and Quartz Hill project areas.

LUD 2: These areas are managed in a roadless state to retain their wildland character. Wildlife and fish habitat improvements and primitive recreation facility development are usually permitted. Commercial timber harvesting is not permitted, but timber may be salvaged to prevent significant damage to other resources. Personal use of wood is allowed for cabin logs, trolling poles, and other similar uses. Water and power developments are permitted if they can be designed to retain the overall primitive characteristics of the area. Roads are not built except to serve authorized activities such as mining, power and water developments, aquaculture, transportation needs determined by the State and vital Forest transportation system linkages. The use of snowmachines, motorboats and airplanes on freshwater is permitted; however, restrictions may be imposed on a case-by-case basis to prevent excessive use. Appropriate landscape management techniques will be applied in the design and construction of all improvements to minimize (adverse) impacts on recreation resources. Major concentrated recreation facilities will generally be excluded.

LUD 3: The emphasis in these areas is to manage for both amenity and commodity uses in a compatible manner which provides the greatest combination of benefits. Potential timber yields are reduced to the extent needed to protect important biological and aesthetic values. Permanent and temporary roads are located and designed to retain important recreation and scenic qualities. Trails and a full range of recreation facilities is permitted.

LUD 3 (Special): The purpose of this allocation variation is to minimize (adverse) impacts on visual and recreation resources in areas directly adjacent to communities. It is similar to LUD 3 except that any timber harvest activities (e.g. firewood, free use for house logs, trolling poles, etc.) will be compatible with local recreation and visual resource uses. These areas are excluded from the calculation of timber yield.

LUD 4: The purpose of this allocation is to provide opportunities for intensive development of resources. Emphasis is primarily on commodity resources and their use. Amenity values are also provided for. When conflicts between competing resources arise, they are are most often resolved in favor of commodity values. Allowances in calculated potential timber yield have been made to provide for the protection of physical and biological productivity. Permanent and temporary roads may be built and motorized use is generally permitted. Trails and a full range of recreation facilities are provided.

TABLE 3-97
SUMMARY OF LAND ALLOCATIONS

Land Use Designation	Percent of Forest Lands
LUD 1	36 percent
LUD 2	16 percent
LUD 3	17 percent
LUD 4	25 percent
Unallocated	7 percent

Currently, 92 percent of the Forest remains in an essentially unmodified, unroaded condition.

With the current allocation approximately 229 recreation places totaling 1.9 million acres are within LUD I (Wilderness and released LUD I areas). Much of this acreage is accounted for within Admiralty Island National Monument/Wilderness because of the methodology used to inventory recreation places within that Monument. Approximately 183 recreation places totalling more than 636,000 acres are in LUD II. All of these areas are essentially being managed to retain their current capacity and opportunity for recreation with little or no conflict resulting from other resource management activities. Approximately 390 recreation places totalling over 1 million acres are in LUD III, and are potentially subject to alteration. Approximately 422 recreation places totalling 1.1 million acres are within LUD IV areas. Those in undeveloped LUD IV areas are subject to potential development which would change their current more primitive ROS settings to highly modified ROS settings such as Roaded Natural or Roaded Modified. Approximately 105 recreation places totaling a little more than 157,000 acres have LUD classification at this time.

Existing plans for road construction, construction of log transfer facilities and timber harvest will affect some recreation places. Most significant conflicts are likely to occur where proposed log transfer facilities occur in bays and anchorages which are popular recreation places. Conflicts also occur where new roads are constructed (changing the recreation opportunity class) but where no public access to the road system exists (i.e., not a stop on the ferry route). Because a significant amount of tentatively suitable timber occurs in recreation places (approximately 1,400,000 acres, or 27 percent of all recreation place acres) there is a need in project planning to consider the important recreation features of these places in road and LTF location and design.

Several LUD 3 Special areas located near communities were excluded from the land base used for calculating the 450 MMBF average annual allowable sale quantity. This was done for community-related recreation and aesthetic considerations. LUD 3 (special) VCU's were generally not allocated to LUD 2 since they were already roaded or otherwise developed. These VCU's are cross-hatched on the TLMP map. Elsewhere, LUD 3 allocations were based on a consideration of known human use patterns and important biological and physical resources that could be affected by timber harvesting.

The acres allocated to LUD 2 included a number of VCU's recommended throughout the planning process to protect key fisheries, wildlife, recreation, and other resources. Many of the VCU's were consistently allocated to LUD 2 during the planning process because they either lacked operable CFL and were unsuitable for allocation to LUD's 3 or 4 (as noted in TLMP FEIS, Appendix A) or they were not desired for inclusion as Wilderness due to a lack of public support (TLMP, amendment 1985-86, p.13).

<u>Specific Management Area Direction</u>. The Tongass is divided into 141 Management Areas (MA's) ranging in size from a few thousand acres to over two million acres (see TLMP map). The MA's are to provide more localized management direction and to facilitate Plan implementation. The recreation related activities which were scheduled in the Plan include:

> Recreation Facilities: Construction/reconstruction of recreation facilities such as cabins, docks, boat mooring buoys, visitor parking facilities, campgrounds, and visitor centers.
>
> Trail Construction: Construction/reconstruction of recreation trails, including right-of-way acquisition.

A summary by administrative area of the recreation facilities and trail projects which were scheduled in TLMP and amended in 1985, compared to the actual projects funded, is shown in Table 3-98. (TLMP and Amended TLMP and Annual Budget Advice Records).

As can be seen (Table 3-98) a low percentage of the recognized recreation and trail projects that were scheduled in the Forest Plan were actually funded and implemented. Before the Plan was amended many of the projects were identified as "future" with no date of need identified. Recreation project development seemed to be on a "wait and see" basis for scheduling. When the Plan was amended in 1985 the Forest Areas seemed more definite in the amount and timing of needed projects. Also, more of the Management Areas were recognized as having need or potential for recreation and trail development. The Stikine Area had the highest percentage of accomplishment based on scheduled projects.

TABLE 3-98
RECREATION PROJECT SCHEDULING AND FUNDING, 1980-1988

	Scheduled Projects		Actual Projects Funded	
Area	Recreation	Trails	Recreation	Trails
	1980-1985			
CHATHAM AREA:	Cabins..38	63 projects	1	18 mi.
	CGs.....6		3	
	Marine..5			
	VIS.....3			
Of 61 Management Areas, 15 had recreation or trail projects scheduled.				
KETCHIKAN AREA:	Cabins..23	57 projects	2	17 mi.
	CGs.....51			
	Marine..1			1 Tramway
	VIS.....0			
Of 45 Management Areas, 8 had recreation or trail projects scheduled.				
STIKINE AREA:	Cabins..2	30 projects	12	31 mi.
	CGs.....32			
	Marine..0			
	VIS.....0			
Of 35 Management Areas, 7 had recreation or trail projects scheduled.				
	1986-1988			
Note: After the Forest Plan amendment, scheduling was done by numbers of projects, not specific kinds of projects. The budget allotment identified specific kinds of projects.				
CHATHAM AREA:	25 projects	22 projects		
	Cabins		1 + gen. rehab.	12 mi.
	Campgrounds		0	
	Marine		1 project	
	Visitor Center		3 projects	
Of 61 Management Areas, 23 had recreation or trail projects scheduled.				
KETCHIKAN AREA:	52 projects	24 projects		
	Cabins		1 + gen. rehab.	11 mi.
	Campgrounds		6 projects	
	Marine		2 projects	
	Visitor center/Information Service		2 projects	
Of 45 Management Areas, 15 had recreation or trail projects scheduled.				
STIKINE AREA:	6 projects	7 projects		
	Cabins		5 projects	11 mi.
	Campgrounds		3 projects	
	Marine		2 projects	
	Visitor Center/Information Service		4 projects	
Of 35 Management Areas, 19 had recreation or trail projects scheduled.				

NOTE: Trail "projects" do not indicate mileges in the Forest Plan. However, records of actural projects funded did indicate mileage. (

Area Analysis

Area Analysis direction in the 1985 amended Forest Plan asks each Forest Supervisor to "...identify, on a case by case basis, the relevant geographic area; the social, resource, and management considerations which will be addressed; and the relative level of analysis necessary. The analysis usually will include evaluation of specific alternatives in order to determine the feasibility and environmental effects. The analysis will follow the NEPA process, provide opportunity for public comment, and conform to Regional and National Forest service direction...". In addition several "main purposes" of area analysis are give. Among these (that particularly pertain to management of the recreation resource) are:

(a) Determine the general feasibility of implementing the proposed projects. . . considering resource characteristics, related economic factors, and local issues and concerns.
(b) Identify optimal locations . . . for the feasible projects.
(c) Define appropriate standards and guidelines (prescriptions) to guide the implementation of feasible projects.
(e) Identify additional resource management opportunities to provide information for Area-wide Project Scheduling.
(h) Describe the feasible projects for consideration in the Forest Service budget process.

OPPORTUNITIES

Evaluation of Current Program

Current direction in the Forest Service Manual and Regional Guide provides sufficient guidance to meet the broad issues and concerns identified in scoping. Finalizing of the R-10 2300 Manual Supplements that have been in draft status for several years will help in establishing the standards and guidelines needed for Analysis Area planning as envisioned in the 1985 amended Forest Plan (p. 199).

The Regional Guide gave direction to identify and protect areas that possess unusual. . . recreational. . . values, and recognize and protect lands having special values, such as . . . anchorages, small boat routes, ferry and ship routes, recreation beaches, . . . hunting areas, wildlife observation areas, sport-fishing streams, and trails as part of the land management process. However, there has generally been little emphasis placed on these actions, and they have been inconsistently implemented between Forest Areas. While a Forest-wide ROS inventory was made in the mid-1980's, there appears to have been little analytical use made of the information. No comprehensive recreation resource inventory occured prior to the effort initiated by the Forest Plan Revision process. The result has been an appearance of de-emphasizing or overlooking recreation opportunities in Management Area Plans. It is unknown at this time how many existing, undeveloped recreation places have been significantly altered since 1980 due to implementing the Forest Plan.

Scoping for the Forest Plan Revision generally revealed public concern over the larger questions of land allocation for development (timber harvest and mining) as opposed to preservation of undisturbed landscapes and related wildlife and fish habitats, particularly within the "home range" zones of most communities. Some discussion of facility needs on a local basis appeared in scoping, most often in reference to adding to the cabin system and constructing or reopening trails near the communities. It appears that if the projects scheduled in the Management Area summaries in the amended Plan were implemented those issues and concerns would be met. However, to accomplish those projects in any kind of a timely manner the annual recreation capital investment budget would have to be substantially increased. There are no cost estimates accompanying the scheduled projects in the amended Forest Plan. A review of these projects and an estimate

of the cost to implement them is needed as a part of the Revision. The accomplishment over the past eight years is somewhere in the 35 percent range. Most capital investment projects are for major rehabilitation or replacement of existing facilities. Most of the Region's recreation budget was allocated to the Begich Boggs Visitor Center on the Chugach NF in the mid-1980's. The Ranger Districts also make a conservative estimate of $2.5 million annually needed to adequately provide operation and routine maintenance service to the nearly 1,300 recreation places inventoried (and currently being used) throughout the National Forest.

Unique Recreation Opportunities

The obvious setting that makes the Tongass different from other National Forest recreation opportunities is the island and marine environment in such close association with major mountain ranges and icefields. More specifically the Forest also offers vast unmodified landscapes and wildland wildlife and fish habitats unequaled on other National Forests. Because of the island and marine environment there is an abrupt change in character from the relatively small urbanized centers of population to almost immediate wilderness.

Outdoor recreation in Southeast Alaska is much more demanding of skills and proper equipment in order to deal safely with the environment than in most other Forests. More specifically there are newly discovered wild caves with environments of unknown nature; multitudes of rivers and streams which could add new dimensions to the Nation's Wild and Scenic Rivers System; and recreation opportunities that can only be accessed by boat or aircraft. The Region's recreation cabin system and interpretive program on the Marine Highway ferries are extremely popular and highly utilized by resident and visitor alike. And the opportunity to hunt and view large and often dangerous wildlife species is still available on the Tongass. But an underlying concern among many outfitters and guides throughout Alaska is the diminishing of the primitive, uncrowded settings as more people visit and/or participate in wildland adventure activities.

Information Needs

One of the most noticeable obstacles to comprehensive planning for recreation and Wilderness management has been the dearth of reliable information concerning the use and value of the outdoor recreation resources found in Southeast (and all other parts) of Alaska. Better and up-to-date information needs ranging from simple accounting of existing use to indepth socioeconomic impacts of changing values and lifestyles is needed. The Alaska Public Survey conducted in the late 1970's is the most current information available; social and economic values may have changed since that time. The ongoing state tourism surveys are not designed to provide much information that is useful in developing strategies which recognize the amount and nature of the role the public lands play in the state's tourism industry, and these surveys ignore the use by, or impacts on, local residents.

It seems apparent that a continuation of the Southeast Alaska Pleasure Visitor Research Program designed and conducted in 1988 is needed to track the trends of the recreation and tourism impacts on the Southeast economy.

Similarly, the Alaska Public Survey of residents should be updated and perhaps expanded upon to the same depth and specificity as the TRUCS study of subsistence use in Southeast. There are many indications that outdoor recreation opportunities and pursuits by residents are as highly valued and important to the overall lifestyle and social well-being as are subsistence activities. Such information is essential to the management of the recreation resource.

RESEARCH NATURAL AREAS

OVERVIEW

The dedication of tracts of land and water for scientific and educational use and the maintenance of natural diversity is a large and growing activity. The Forest Service has traditionally been a leader in this field, establishing the first Research Natural Area (RNA) in 1927 on the Coronado National Forest (Franklin and others 1972). By 1973 there were 100 RNA's on the National Forest System and 150 RNA's in 1986. Between 550 and 700 additional RNA's are proposed in the first generation of National Forest Plans covering the 154 National Forests (Juday 1986).

In the late 1970's, the Joint Federal-State Land Use Commission for Alaska built upon previous efforts and launched a cooperative program to identify and establish areas for scientific and educational use (Underwood and Juday 1979). The Alaska Ecological Reserves program has continued in partnership with the State of Alaska (University of Alaska) and federal agencies (Juday 1983). The Alaska Ecological Reserves program provides a mechanism to see that each agency seeks Research Natural Areas that are most characteristic or best represented on its lands. The statewide and comprehensive focus of the program avoids duplication of efforts among agencies and insures the establishment of a network of RNA's selected from a common basis and described to a common standard of information. The Alaska Region of the Forest Service was a charter member of the Alaska Ecological Reserves Council that launched the effort and has been one of the most important supporters of the program. To avoid a proliferation of terms, ecological reserves in Alaska have mostly been established under the RNA authority and label.

Regulations implementing the National Forest Management Act (NFMA) make selection and establishment of RNA's a part of the continuing land and resource management planning process for the National Forest system (36 CFR 251.23 and 219.25). The NFMA regulations provide that Forest Service Regional Guides shall identify the regional criteria used in establishing RNA's and the forest types, plant communities, aquatic systems, and geologic features that are needed in a representative RNA system for that given region.

The Alaska Regional Guide (1983) provides a preliminary list of plant community types, geological features, shrub species, and a restricted set of wildlife species that need to be included in the RNA system (Regional Guide, Appendix IV). The Guide provides that the features should be searched for in candidate RNA's that optimize the combination of features and minimize land use conflicts. For the Tongass Land Management Plan, the RNA search is directed first toward National Forest Monuments, then to Wilderness Areas (LUD 1), and finally, to Land Use Designations 2, 3, and 4, in that order.

The Forest Service Alaska Region RNA program is given further direction by the Alaska National Interest Lands Conservation Act (ANILCA). ANILCA established large National Forest Monuments and Wilderness Areas to maintain features of scientific importance and in support of science and research among other values.

SUPPLY/INVENTORY

In accordance with the various laws, regulations and policies, a system of Research Natural Areas have been established throughout Region 10 to facilitate study of the ecosystems found in Southeast Alaska.

EXISTING AREAS

Currently six research natural areas are established on the Tongass National Forest. Figure 3-32 shows the location of these research natural areas. The following narrative provides a brief description for each of them:

Pack Creek RNA

Established in 1951; size - 5,779 acres; located on Admiralty Island. This RNA was established to represent old-growth spruce/hemlock forest types in northern Southeast Alaska, and also to represent productive coastal brown bear habitat. The Pack Creek RNA also includes excellent examples of diverse alpine meadows, rockfalls, and snowfields representative of much of northern Admiralty Island. A bear observation platform and access trail were built by the CCC's in 1934 along Pack Creek. This trail was rebuilt in 1985. The RNA Establishment Report indicates that the area is "too far away by boat for much use as a picnic ground, or for other recreation." Conditions have changed dramatically since the report was prepared, with explorer class vessels stopping at the site on a regular basis to visit with old-time resident Stan Price and observe the bears, causing some management concern. This RNA has been used for studies of: 1) old-growth forest structure and long-term dynamics; 2) brown bear behavior, feeding habits, and interactions with people. Neither the Admiralty Wilderness Plan nor TLMP gave any direction for management of the Pack Creek RNA.

The Chatham Area strongly recommends the removal of Pack Creek as an RNA. They would like this recommendation to be ultimately reflected in the Draft EIS preferred alternative. The reasons for this recommendation are:

1) The intense public use of the Pack Creek RNA is not compatible with the purposes of its classification. This use is expected to increase.
2) Research activity (stakes, plots, tags, collars on bears) would not be viewed desirable by the public using the area.
3) The Forest Supervisor Closure Order would significantly restrict research access and researcher numbers within the Pack Creek Cooperative Management Area annually between June 1 and September 10. (A Forest Supervisor closure order is an order which regulates human access into an area; order can restrict access by season, or type of equipment (like restricting motorized vehicles) or number of people.)
4) Public use has already disturbed many of the natural systems in the Pack Creek RNA, such as:
    a. A bear observatory has been in use since the 1930's and is currently being replaced, with use expected to increase.
    b. Pack Creek Trail will receive heavy use once the observatory is replaced. Vegetation in this corridor has been modified.
    c. Stan Price has resided there for over 30 years, and has on site a wannigan, residence cabin, two woodsheds, potato cellar, outhouse, large log raft, with derelict machinery, two 50 foot by 50 foot cultivated gardens, and an abandoned boat.
    d. About 5 acres of beachfront timber have been heavily modified by 30+ years of firewood cutting.

Cape Fanshaw RNA

Established in 1965; size - 600 acres; located at the junction of Frederick Sound and Stephens Passage. This area was established to represent undisturbed old-growth Alaska yellow-cedar and western hemlock forests. It also represents a good example of cedar decline on the mainland, and has been used for long-term monitoring of changes in species composition and stand dynamics. A narrow strip of land between the RNA and the beach serves as a buffer from boating and beach use. Recreation use has not caused any conflic to date. TLMP direction is to "emphasize management of Fanshaw Research Natural Area."

Red River RNA Established in 1980; size - 8,040 acres; located in Misty Fiords Monument Wilderness. This RNA represents the northern range of silver fir (Abies amabilis). Being a newer RNA, the Establishment Report is the first to recognize cultural resource and wilderness values. In the past the Red River RNA has been used for studies of the structure of old-growth silver fir and understory vegetation. While increasing recreation is recognized as likely, no conflicts or hazards to the scientific value of the area are anticipated. The Misty Fiord Interim Management Guidelines in the draft wilderness management plan recognize it as "important." The Red River RNA was not recognized in the Tongass Land Management Plan.

Limestone Inlet RNA Established in 1951; size - 9,102 acres; located in Stephens Passage. Within boating distance of Juneau, this area represents typical vegetation types common to the Juneau mainland, including many avalanche chutes, and a mainland stream with a good fish population. In 1951, Limestone Inlet was considered the most pristine drainage in the northern mainland coast, making it an excellent area for documenting baseline conditions on the mainland. However, Alaska Department of Fish and Game has altered the native salmon runs since 1980 by operating a hatchery in nearby Snettisham Lake, although upland areas still remain intact. The Establishment Report for Limestone Inlet found that it was "not suitable for forest management as merchantable timber is scarce and volumes are low." Although, at the time of its establishment, public recreation use was listed as "negligible," there have been considerable changes primarily due to increased recreational boating and bear hunting. These types of recreation use should not conflict with the RNA purposes. The Tongass Land Management Plan in 1979 proposed that management of this area as an RNA continue.

Dog Island RNA Established in 1976; size - 744 acres; located on Dog Island. This RNA represents a small island ecosystem containing the northern limit of Pacific yew (Taxus brevifolia), associated scrub timber and low volume mixed conifer sites of southern Southeast Alaska. The area is quite remote and no conflicts with recreation are anticipated. This RNA was not mentioned in the Tongass Land Management Plan.

Old Tom Creek RNA Established in 1951; size - 4,727 acres; located on central Prince of Wales Island. Situated in a low-site, cedar-dominated watershed, this RNA was established as an example of cedar-hemlock old-growth forest. It also includes some examples of riparian spruce forest, extensive tidal meadows, and dense bald eagle and black bear populations. In the past it has been used as a control stream for studying logging effects on salmon streams, for pesticide spraying, and for studying the effects of large woody debris in streams. Stream flow has been continuously monitored for the last 20 years. Fish eggs have been taken in the stream, and some temporary fisheries improvements have been constructed. Public recreation use was discouraged in the Establishment Report. Although no recreation conflicts presently exist, due to improved accessibility to and on the island and an increasing demand for stream salmon fishing, future recreation use could increase. TLMP gives no specific direction for this area.

DEMAND ASSESSMENT The Alaska Regional Guide (USDA Forest Service, 1983) identifies plant communities, shrub species, geologic landforms, and animals species which need to be included within a network of RNA's in Southeast Alaska. Table 3-99 provides a brief summary of the number of communities, species and landforms identified by the Regional Guide.

FIGURE 3-32

RESEARCH NATURAL AREAS ON THE TONGASS NATIONAL FOREST

MAP NOT AVAILABLE AT THIS TIME

TABLE 3-99
SUMMARY OF THE NUMBER OF PLANT COMMUNITIES, SHRUB SPECIES, GEOLOGIC LANDFORMS AND ANIMAL SPECIES IDENTIFIED BY THE REGIONAL GUIDE WHICH NEED TO BE INCLUDED WITHIN A NETWORK OF RNA'S IN SOUTHEAST ALASKA

	Number of Plant Communities and Shrub Species
Forest Plant Communities:	Closed Conifer Forest - 11 plant communities
	Open Conifer Forest - 4 plant communities
	Conifer Woodland - 6 plant communities
	Closed Deciduous Forest - 4 plant communities
	Open Deciduous Forest - 1 plant community
Tundra Plant Communities:	Crowberry - 2 plant communities
	Ericaceous Shrubs - 5 plant communities
	Snowbed Communities - 1 plant community
Shrubland:	Alder - 2 plant communities
Herbaceous:	Bluejoint-Herb - 3 plant communities
	Herbs - 5 plant communities
	Elymus - 1 plant community
	Coastal Elymus-Herb - 5 plant communities
	Dune Elymus - 3 plant communities
	Mesic Midgrass - 1 plant community
	Wet Sedge-Grass (freshwater) - 3 plant communities
	Saline Sedge-Grass (tidal marsh) - 5 plant communities
Aquatic Vegetation:	Ponds and Lakes - 1 plant community
	Streams - 1 plant community
Shrub Species:	18 species identified

Geologic Landform Types

Hot Springs and Geothermal Features

Recent Lava Flows

Quaternary Volcanic Vents

Lakes of Geologic Origin: volcanic, ice block kettle hole, slump pond, hanging cirque, tectonic morainal fiord, valley morainal

Solution Pits

Active Dunes System

Restricted Circulation Bay

Reversing Salt Chucks (marine falls)

Coastal Staircase Benches

Open, Wave-Beaten Coast

TABLE 3-99 (CONTINUED)
SUMMARY OF THE NUMBER OF PLANT COMMUNITIES, SHRUB SPECIES, GEOLOGIC LANDFORMS AND ANIMAL SPECIES IDENTIFIED BY THE REGIONAL GUIDE WHICH NEED TO BE INCLUDED WITHIN A NETWORK OF RNA'S IN SOUTHEAST ALASKA

Geologic Landforms (Continued)

Isostatic Rebound

Small Glacial System

Nunataks

Alpine Solifluction Lobe

High Elevation Periglacial Phenomena

Snow Avalanche Chutes

Rotational Block Failure

Mass Wasting and Soil Creep

Active Fault Scarp

Waterfalls and Plunge Pool Systems

Geologic Bedrock Types: sedimentary rocks, igneous rocks, metamorphic rocks

Animal Species

Bald Eagle, Peale's Peregrine Falcon, Bushy-tailed Woodrat, Prince of Wales Otter, Northern Sea Lion, White Sturgeon, Northern Pike, Common Garter Snake

Source: Alaska Regional Guide, USDA Forest Service, 1983.

To date, not all the needed ecosystems identified in the Regional Guide have been included in RNA's on the Tongass National Forest. National Forest Management Act Regulations provide the following direction for RNA's: "Forest planning shall provide for the establishment of RNA's. Planning shall make provision for the identification of examples of important forest, shrubland, grassland, alpine, aquatic, and geologic types that have special and unique characteristics of scientific interest and importance...and that are needed to complete the National network of RNA's."

In response to this planning direction, a research natural areas workshop was organized as a cooperative effort between the Tongass Land Management Planning Team, the Forestry Sciences Lab, and the University of Alaska Ecological Reserves Program. Natural resource scientists and managers were invited to attend and participate in the workshop. The workshop had two primary objectives:

1. To identify the basic units (cells) which should be represented in a Research Natural Area system on the Tongass National Forest. Another way of stating this is: "What kinds of ecosystems and unique features should be represented within Research Natural Areas in Southeast Alaska?"
2. To recommend potential areas on the Tongass National Forest which represent the cells (ecosystems) for Research Natural Area designation. The Tongass

Forest Plan Revision is the best time to recommend areas for Research Natural Area status because of the opportunity to evaluate the areas with other proposed management activities and programs, and to obtain public input on the proposals.

The ecosystems and features identified in the Regional Guide (listed above in Table 3.xx) were reviewed and refined by the workshop participants incorporating new information such as the recent plant association classification developed for the Tongass National Forest.

WORKSHOP OBJECTIVE NUMBER 1

In accomplishing objective number 1, workshop participants identified cell types (ecosystems and/or unique features) needing representation in RNA's in Southeast Alaska. The cell type needs included: vegetation cells, aquatic cells, and wildlife cells. Geology cells were incorporated with the vegetation and aquatic cells. A summary of the vegetation, wildife, and aquatic cell type needs identified at the workshop follows. A more complete discussion of these cell type needs is presented in the planning record report titled: "Research Natural Area Proposals for the Tongass Forest Plan Revision - Results of Research Natural Area Workshops, May 24 & 25 and July 21, 1988," by Juday et al. 1988.

Vegetation Cell Type Needs

The Forest Service Region-10 Ecology Program has recently expanded its forest plant association ecosystem classification system to include the entire Tongass National Forest. The availability of this information, and that from FSL research on plant ecology makes the definition of the biotic diversity of the Tongass much more precise than the original Regional Guide, and this classification system was used by workshop participants to identify vegetation cell type needs for RNA's.

The forest plant associations are divided into seven major series based on dominant tree species:

1. Shorepine Series (Pinus contorta)
2. Mountain Hemlock Series (Tsuga mertensiana)
3. Mixed Conifer Series (Mixed conifer refers to a stand of timber with Mountain hemlock/western hemlock and Alaska Cedar codominants. This plant association is usually present at lower elevations.
4. Western Hemlock-Alaska Cedar Series (Tsuga heterophylla/Chamecyparis nootkatensis)
5. Western Hemlock-Red Cedar Series (Tsuga heterophylla/Thuja plicata)
6. Sitka Spruce Series (Picea sitchensis)
7. Western Hemlock Series (Tsuga heterophylla)

Within each of these series, individual plant associations have been defined which include dominant understory plants. In total, approximately 46 plant associations have been defined for the Tongass.

Seven different geographic provinces have been described for Southeast Alaska based on differences in climate and geology (Juday et al. 1988). For each geographic province, typical and unique plant associations or communities which should be included in RNA's are identified (Table 3-100). In some cases these features encompass whole series and in others an especially critical or unique feature justifies using just one plant association as a cell type. Primary emphasis has been placed on forest plant associations since these are the most likely to be impacted by management, and are the most relevant when used as a baseline to compare with managed areas. For the non-forest types, cell types from the Regional Guide are still valid, but lack of on-the-ground resource information precluded their use for all but a few RNA proposals.

TABLE 3-100

VEGETATION CELL TYPES RECOMMENDED TO BE REPRESENTED IN RNA'S IN SOUTHEAST ALASKA.

I. Yakutat Geographic Province

Typical vegetative features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories)
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories)
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Sitka spruce-cottonwood forests on recent uplifted beach soils and in association with active floodplains (alder, willow, and devil's club understories).
5. Glacial outwash meadows with sandy beach deposits.
6. Willow dominated brush fields

Special types:

7. Disjunct populations of shore pine and associated muskeg features.
8. Post-glaciation successional types, including sea level valley glaciers as well as ice-dammed areas.

II. Northern Outer Islands Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories)
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories)
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).

Special types:

6. Exposed outer coast Sitka spruce-Pacific reedgrass beach forests.
7. Sitka spruce-sweet gale in protected coves.
8. Recent volcanic ash successional types.
9. Extensive ice retreat-glacial successional types
10. Hot springs

III. Northern Interior Islands Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories)
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories)
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).

Special types:

6. Hot springs.

TABLE 3-100 (CONTINUED)
VEGETATION CELL TYPES RECOMMENDED TO BE REPRESENTED IN RNA'S IN SOUTHEAST ALASKA.

IV. Lynn Canal Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories)
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories)
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).
6. Sitka spruce-cottonwood floodplain and marine terrace forests (alder, willow, devil's club understories).

Special types:

7. Lodgepole pine forests of fire origin.
8. High elevation subalpine fir forests at northwest extent of natural range.
9. Sitka spruce-sweet gale in protected coves.
10. Isolated nunatak floras.
11. Southern and western extent of range of various alpine and forest plant species near Canadian border.

V. Coast Range Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories)
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories)
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).
6. Western hemlock-western redcedar series (blueberry, swordfern, skunk cabbage, devil's club, salal understories)

Special types:

7. Recent lava flow successional types
8. Pacific silver-fir at northern extent of range
9. Swordfern, and salal at northern extent of range
10. Large river gorges with more continental climate and isolated populations of boreal plant species.

VI. Central Interior Islands Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories)
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories)
3. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).

TABLE 3-100 (CONTINUED)
VEGETATION CELL TYPES RECOMMENDED TO BE REPRESENTED IN RNA'S IN SOUTHEAST ALASKA.

4. Western hemlock-Alaska cedar series (productive blueberry types through to less productive skunk cabbage associations).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).
6. Western hemlock-western redcedar series (blueberry, swordfern, skunk cabbage, devil's club, salal understories)
7. Beach Sitka spruce-false lily of the valley forest.

Special types:

8. Northern extent of range of western redcedar
9. Northern extent of range of swordfern, salal
10. Highly productive mature old-growth even-aged forests of fire origin in rainshadow areas (western hemlock series with blueberry understory)
11. Productive Sitka spruce-devil's club-enchanter's nightshade on active loess soils.
12. Hot springs.

VII. Southern Outer Islands Geographic Province

Typical features:

1. Riparian Sitka spruce (devil's club, salmonberry, and blueberry understories)
2. Upland western hemlock series (highly productive with shield fern through to poorly drained skunk cabbage understories)
3. Western hemlock-western redcedar series (blueberry, swordfern, skunk cabbage, devil's club, salal understories)
4. Mountain hemlock series (blueberry, copper bush, heather, and false hellebore understories).
5. Muskeg types including blanket bogs and sloping bogs (blueberry, skunk cabbage, deer cabbage, lady fern, shore pine-crowberry associations).

Special types:

6. Exposed outer coast Sitka spruce-Pacific reedgrass, meadow rue, beach forests.
7. Productive mature even-aged forests (blueberry-shield fern associations, 150-300 years old)
8. Productive old-growth forests on gentle topography, limestone-marble soils derived from ancient coral reefs.
9. Sitka spruce-sweet gale in protected coves.
10. Glacial refugia with disjunct populations of subalpine fir. (Glacial refugia are areas not glaciated during the last glacial period).
11. Glacial refugia and disjunct populations of alpine plant species with some at their northern extent of range.
12. Northern extent of range for Pacific yew and associated species.
13. Hemlock series forests and meadow vegetation on ultramafic bedrock types.

Source: Juday et al. 1988.

Wildlife Cell Type Needs

Workshop participants identified 35 wildlife species which represented management indicator species, special interest species, and unique species occurring in Southeast Alaska. Where information was available, the habitats for these species which should be represented within RNA's were identified. Table 3-101 summarizes the 35 wildlife species and the recommended habitats.

TABLE 3-101
WILDLIFE SPECIES AND HABITATS RECOMMENDED AS CELL TYPE NEEDS FOR RNA's ON THE TONGASS NATIONAL FOREST

Management Indicator Species	Recommended Habitats for RNA's
1. Brown bear	a. Areas with cave dens
	b. Habitats with high population densities utilizing tidal meadows, both on island and mainland.
	c. Habitats with high population densities along anadromous fish streams, both on island and mainland.
	d. Alpine feeding areas, both on island and mainland.
2. Bald eagle	a. High density nesting habitat
	b. Possibly also a winter roosting area
3. Sitka black-tailed deer	a. Habitats with a high density population in optimal winter range with no wolf predation
	b. Habitats with a high density population in optimal winter range with wolf and bear predation
	c. Summer alpine habitat
4. Vancouver Canada goose	a. Nesting
5. Mountain Goat	a. Natural winter range habitat, southern mainland and northern mainland (low elevation)
	b. Summer alpine habitat
6. Moose	a. Summer and winter habitat, preferably in the Yakutat and Stikine areas
7. Pine marten	a. Natural mainland habitat
	b. Possibly an area on Prince of Wales Island
8. Wolf	a. Habitat would coincide with deer and/or moose habitats
9. Black bear	a. Habitats with a feeding concentration along an anadromous fish stream, both on island and mainland
10. Hairy woodpecker	a. Nesting habitat
11. Brown creeper	a. Large diameter trees providing optimum nesting and wintering habitat
12. Common merganser	a. Nesting and brood rearing habitat
13. Red squirrel	a. Year-round habitat
14. Red-breasted sapsucker	a. Nesting habitat

TABLE 3-101 (CONTINUED)
WILDLIFE SPECIES AND HABITATS RECOMMENDED AS CELL TYPE NEEDS FOR RNA's ON THE TONGASS NATIONAL FOREST.

15.	River Otter	a.	Beach fringe habitat and riparian habitat
		b.	Denning habitat in uplands
		c.	Inland lakes habitat
16.	Blue grouse	a.	(none were identified by the workshop participants)
Special Interest Species			
17.	Steller's sea lion	a.	Hauloutsites, permanent sites, they do not drift around. 1/
18.	Harbor seal	a.	Haulout site with no icebergs
19.	Sea bird colonies	a.	Nesting habitat (rookeries)
20.	Marbled murrelet	a.	Nesting habitat (will require more research to define exactly what constitutes nesting habitat)
21.	Trumpeter swan	a.	Nesting habitat
		b.	Wintering habitat
22.	Common loon	a.	(none were identified by the workshop participants)
23.	Glacier color phase of black bear	a.	(none were identified by the workshop participants)
Unique Species			
24.	Garter snake	a.	(none were identified by the workshop participants)
25.	Prince of Wales flying squirrel	a.	(none were identified by the workshop participants)
26.	Long-toed salamander	a.	(none were identified by the workshop participants)
27.	Osprey	a.	Nesting habitat
28.	Spruce grouse	a.	Habitat on Prince of Wales Island
29.	Peregrine falcon	a.	Nesting habitat
30.	Saw-whet owl	a.	(none were identified by the workshop participants)
31.	Goshawk	a.	Nesting habitat
32.	Screech owl	a.	(none were identified by the workshop participants)
33.	Coronation Island vole	a.	(none were identified by the workshop participants)
34.	Prince of Wales ermine	a.	(none were identified by the workshop participants)
35.	Sumez Island ermine	a.	(none were identified by the workshop participants)

Source: Juday, et al. 1988

1/ Haulout sites are land areas used by some marine mammals for resting and other needs.

The workshop participants recognized that many of the cell type needs listed above were not mutually exclusive, and many could be satisfied within a few carefully selected RNA's. Eight general types of habitats were identified by the work group which, if represented in RNA's, would satisfy many of the cell type needs. These eight general types of habitats are:

1. Riparian spruce habitat which would provide cell needs for the black bear, brown bear, river otter, common merganser, and pine marten.

2. A range of high to low volume upland hemlock/spruce habitats which would provide cell needs for deer, pine marten, blue grouse, wolf, cavity nesting species, mountain goats (rocky, low elevation winter), and goose.

3. Alpine/subalpine habitats which would provide cell needs for deer (summer), mountain goats, blue grouse, wolf.

4. Wetland habitats which would provide cell needs for swans and geese.

5. Beach fringe habitats which would provide cell needs for eagles, otter, black and brown bears, deer (winter), and marten (summer and winter).

6. Estuary habitats which would provide cell needs for black and brown bears, geese, common merganser, and moose.

7. Deciduous shrub habitats which would provide cell needs for moose and wolf.

8. Isolated small islands which would represent small mammal island biogeography effects.

The workshop participants then prioritized these eight general habitats for identifying and recommending RNA's. The priority is as follows:

Priority 1 - Riparian spruce, estuary, beach fringe.

Priority 2 - High volume upland hemlock/spruce.

Priority 3 - Isolated small islands.

Priority 4 - Medium to low volume upland hemlock/spruce, alpine and subalpine habitats, wetland habitats, deciduous habitats.

The workshop participants also recommended that each of the eight general habitats should be represented in an RNA within each of the seven geographic provinces.

Aquatic Cell Type Needs

Workshop participants identified over 60 aquatic cell type needs for RNA's on the Tongass National Forest. These cell type needs are listed in Table 3-102.

TABLE 3-102

AQUATIC CELL TYPE NEEDS RECOMMENDED FOR RNA's ON THE TONGASS NATIONAL FOREST.

Lake Attribute Cell Types

1,2,3	Oligotrophic, eutrophic, meromictic (with a chemocline)
4,5	Alkaline, acidic
6,7	Clear, stained
8,9	High elevation, low elevation
10,11	Stratifying (with thermocline), non-stratifying (without thermocline)
12	With outlet, without outlet
13,14	Anadromous, no anadromous, barren, resident only
15,16	With cutthroat, no cutthroat trout
17	With lake spawning sockeye
17a	High productivity

Lake Type Cell Types

18	Hanging (cirque)
19	Rockbasin (primarily bedrock controlled)
20	Kettle
21	Muskeg ponds and small lakes
22	Salt chuck (not really a true lake)
23	Proglacial (lake occupying a basin in front of a glacier)

Unique System Cell Types

24	Pike Lakes
25	Volcanic lakes
26	A dune lake
27	A landslide lake
28	Lava Fork River - Blue River
29	Island race of king salmon
30	Limestone creek that goes subsurface
31	A volcanic lava/ash system
32	A meromictic lake
33	A hot springs
34	A very late run of coho salmon (February)
35	Summer run of steelhead

Fish Attribute Cell Types

36	Island king salmon
37	High quality king salmon rearing
38	Mainland king salmon
39,40	Systems free of stocking (need small and large lakes/streams)
41	Lake rearing coho
42	Stream rearing coho
43	Early run coho
45	Late run coho
46	Trophy cutthroats
47	Fall run steelhead
48	Summer run steelhead
49	Lake spawning sockeye
50	Stream rearing sockeye
51	Pink salmon only systems (steep)
52	Systems with high diversity
53	Sea-run cutthroats

TABLE 3-102 (CONTINUED)
AQUATIC CELL TYPE NEEDS RECOMMENDED FOR RNA's ON THE TONGASS NATIONAL FOREST.

Fish Attribute Cell Types (continued)	
54	Northern pike
55	Overwintering sea run cutthroats and dolly varden
56	Landlocked lakes with no cutthroats, only dolly varden and kokanee
56a	Hooligan
56b	High productivity for fish
56c	Northern run of spring steelhead
56d	Resident native rainbow
Estuarine Cell Types	
57	Type E1 (extensive flats, deposits, which include mudflats with bivalves)
58	Glacial large flats
59	Small deltas (type E2), generally with large-sized substrate (Substrate refers to the size or rock in the bed (bottom) of rivers and streams)
60	Outer coast, rock headlands
61	Long-shore drift - channel outlets include estuaries inside of sand dunes (outer coasts only)
62	Temperature-sensitive stream cell type

Source: Juday et al, 1988

The workshop participants recognized that many of the cell type needs listed above were not mutually exclusive; that is, many cell types would be filled within a watershed if RNA proposals were carefully selected with consideration for watershed types in Southeast Alaska. They identified "typical" watershed types which should be included in RNA's, recognizing that many of the 60+ aquatic cell type needs would be included within the typical watershed types. The "typical" watersheds and their characteristics are shown in table 3-103.

TABLE 3-103

WATERSHED NEEDS RECOMMENDED FOR RNA's ON THE TONGASS NATIONAL FOREST.

Rock Basin Lake System Watersheds:

- High scour
- Scooped out of bedrock
- Originally glacially formed
- Bedrock control, numerous control (nick) points
- Range from small to large systems
- Process groups: contained mountainslope, moderate contained
- Typically found in geographic provinces 2 (Northern Outer Islands) and 4 (Lynn Canal)

Alluvial "U" Shaped Valley Watershed with Steep Side Slopes

- Spruce riparian communities in valley bottoms
- Small (e.g. Limestone), medium (e.g. Gambier) and large (e.g. Kadashan) systems, although there can be considerable differences between them
- Bedrock control on mountainslopes, alluvium on valley bottoms
- Typically found in geographic provinces 2 (Northern Outer Islands), 4 (Lynn Canal) and 5 (Coast Range)

Glacial (active) -- Mainland Valley Watersheds

- Typically found in geographic provinces 1 (Yakutat), 3 (Northern Interior Islands) and 4 (Lynn Canal)

Glacial (active) -- Outwash Plain Watersheds

- Typically found in geographic province 1 (Yakutat)

Alluvial - Low Overall Gradient, Rolling Topography Watersheds

- Mixed controls (stream channel controls)
- Various bedrock
- Mixed vegetation
- Low gradient alluviums
- Some watersheds with lakes, lakes, although some without
- Typically found in geographic provinces 5 (Coast Range), and 6 (Central Interior Islands) and small parts of 2 (Northern Outer Islands)

Steep Streams Terminating in Salt Water

- Various substrates (sizes of rock in the stream or river bed (bottom)
- Typically bedrock control, although sometimes large rock
- Typically found in all geographic provinces

Raised Marine Terraces with Marine Clays

- Parts of Kupreanof Island, west side of Duncan Canal (could be a small watershed), maybe a tributary to Iyoutuk, maybe somewhere on North Chichagof

WORKSHOP OBJECTIVE NUMBER 2

To accomplish objective number 2, workshop participants identified over 60 potential candidate areas on the Tongass National Forest which could represent the vegetation, wildlife, and aquatic cell type needs. Since so many areas were candidates as possible new RNA's, the workshop participants established criteria to identify priorities among potential candidate RNA sites. The following criteria were adopted:

- Recommend RNA's that satisfy the greatest number of cell needs.
- Focus RNA proposals on features declining or under greatest threat.
- Distribute RNA's among geographic provinces and categories of cell type needs.
- Consider history of research and cost effectiveness of conducting research.
- Recommend RNA's which represent the most pristine background conditions.
- Avoid conflicting land uses already established; choose RNA's as free of conflicting land uses as possible (follow Regional Guide procedures).
- Define priorities among RNA type needs.
- Consider optional RNA proposals for features that are replicated on the forest.
- Nominate only the number of RNA's which can be effectively dealt with during the life of the Plan (for which we can have Establishment Reports accomplished during the next 10-15 years).
- Articulate all important RNA type needs.

Evaluation

The steering committee evaluated these potential candidate RNA proposals using the following steps:

1. Each of the areas was evaluated using the criteria listed above and the direction for RNA's in the Regional Guide.
2. Field trips were made to many of the potential candidate RNA's to gain on-the-ground knowledge. Information from these field trips, additional study of available scientific and resource information, and written comments from scientists and resource specialists unable to attend the workshops, resulted in some new potential candidate RNA's and changes in ranking.
3. Glenn Juday studied herbarium and other collection information to define uncommon plants for Southeast Alaska, and used this information as an additional criterion to evaluate potential candidate RNA's.
4. The Tongass Administrative Areas and Ranger Districts subsequently reviewed all of the potential candidate RNA proposals and provided the RNA Steering Committee with additional resource information for minerals, timber, State and Native land selections, fish enhancement projects, developed and undeveloped recreation uses, existing and proposed transportation needs, and other pertinent information affecting the suitability of each area for consideration as an RNA. Several additional potential candidate RNA proposals were recommended by the Ketchikan Area to help fill some of the cell type needs.

POTENTIAL CANDIDATE RNA PROPOSALS FOR CONSIDERATION IN THE REVISION

As a result of the RNA workshop and review by the three Administrative Areas, and to represent the wide geologic, biologic, and climatic diversity encompassed within the Tongass National Forest, 30 new potential candidate RNA's are proposed for consideration during the Tongass Forest Plan Revision. This is roughly 10 per administrative area. These 30 new potential candidate RNA's are termed "priority potential RNA's" and are listed in Table 3-104. This proposal is roughly equivalent, in density, to what has been proposed for most other National Forests in their land-use plans to date (8-10 per National Forest, Juday, 1986). Three to six priority potential RNA's are proposed in each geographic province (except Lynn Canal) so that the typical features of each region are adequately represented. In many cases, valuable, well documented

proposals were not recommended as priority potential RNA's due to redundancy in features with existing or proposed RNA's, or unreasonable resource conflicts.

A second category, termed "other recommended potential RNA's," was used to classify RNA proposals with good documentation and high value, but somehow redundant with priority potential RNA's, or with key features of lower priority than the "priority potential RNA's." These "other recommended potential RNA's" could be used to replace one or more of the priority potential RNA's if some of the priority proposals are not selected (Table 3-105).

RNA selection procedures described in the Regional Guide were followed. The principle result of this procedure was the recommendation of LUD 1 (wilderness) areas whenever possible, otherwise LUD 2 areas were considered, then LUD 3 and 4. Table 3-106 summarizes the RNA proposals by LUD's. Entire small watersheds were preferred over portions of large watersheds to minimize effects of management activities on adjoining lands. Diverse landscapes were preferred over homogeneous ones so that the greatest number of cell type needs would be included in each proposal.

Tables 3-107, 3-108 and 3-109 display how the existing RNA's and the proposed potential RNA's fill the vegetation cell type needs, wildlife cell type needs, and aquatic cell type needs, respectively.

TABLE 3-104
PRIORITY POTENTIAL RESEARCH NATURAL AREA PROPOSALS

Map Symbol	
	YAKUTAT FORELANDS GEOGRAPHIC PROVINCE
54	Akwe Beach
61	Akwe-Ustay Lakes
4	Mountain Lake
51	Pike Lakes
6	Upper Situk
	LYNN CANAL GEOGRAPHIC PROVINCE
2	Warm Pass
57	Dayebas Creek
	COAST RANGE GEOGRAPHIC PROVINCE
24	Blue Lake Lava
78	Martin River
50	Robinson Lake
56	Twin Lakes
	NORTHERN OUTER ISLANDS GEOGRAPHIC PROVINCE
20	Crater Ridge-Freds Creek
14	Myriad Islands
45	Plotnikof-Port Banks
	NORTHERN INTERIOR ISLANDS GEOGRAPHIC PROVINCE
19	Chaik Bay
16	Gambier Bay
10	Tiedeman Island
5	Pleasant Island
9	Upper Tenakee Inlet Hot Springs
6	Swan Cove
	CENTRAL INTERIOR ISLANDS GEOGRAPHIC PROVINCE
27	Bailey Bay Hot Springs
49	Falls Creek Windthrow
22	Kadin Island
60	Port Camden Fossil
29	South Etolin Island
	SOUTHERN OUTER ISLANDS GEOGRAPHIC PROVINCE
38	Disappearance Creek
42	Johnson Lake
25	Mount Calder-Virginia Mountain
28	Sarkar Lakes
39	Thunder Mountain

Source: RNA Workshop, May 24 & 25, and July 21, 1988.

TABLE 3-105

OTHER RECOMMENDED POTENTIAL RESEARCH NATURAL AREA PROPOSALS

Map Symbol	
	Yakutat Forelands Geographic Province
52	Lost River
	Lynn Canal Geographic Province
44	Lower Endicott River
3	Berner's-Lace River
58	Katzehin River Meadows
	Coast Range Geographic Province
26	Anan Creek
59	Yehring Creek
	South Fork of Chickamin (not mapped)
	Northern Outer Islands Geographic Province
17	Lake Eva
55	Redoubt Lake
23	Lover's Creek
	Northern Interior Islands Geographic Province
13	Tonalite Creek
	Central Interior Islands Geographic Province
21	Duncan Salt Chuck
48	West Duncan Uplift
75	McDonald Lake
	Southern Outer Islands Geographic Province
76	Hunter Bay - Biscuit Lagoon
41	Klakas Lake
9.	South Sumez - Angel Falls (not mapped)

Source: RNA Workshop, May 24 & 25, and July 21, 1988.

TABLE 3-106

NUMBERS OF PRIORITY AND OTHER RECOMMENDED POTENTIAL RNA'S BY TLMP LUD CATEGORY

	TLMP Land Allocation Category					
	LUD 1	LUD 2	LUD 3	LUD 4	Release	TOTAL
Priority RNA's	11	7	6	5	1	30
Other Recommended RNA's	5	8	2	2	-	17
Total	16	15	8	7	1	4

Source: RNA Workshop, May 24 & 25, and July 21, 1988.

TABLE 3-107

SUMMARY OF HOW THE EXISTING RNA's AND THE POTENTIAL RNA PROPOSALS FILL THE VEGETATION CELL TYPES. 1/

Existing RNA's and Potential Proposals	Vegetation Cell Type 2/										
YAKUTAT PROVINCE	1	2	3	4	5	6	7	8			
Akwe Beach	-	-	-	-	•	x	-	-			
Akwe-Ustay Lakes	-	-	-	x	-	x	-	x			
Mountain Lake	x	x	x	-	-	-	-	-			
Pike Lakes	-	x	-	-	-	-	•	-			
Upper Situk	x	-	-	-	x	•	-	-			
Lost River	x	-	-	-	x	x	-	-			
LYNN CANAL PROVINCE	1	2	3	4	5	6	7	8	9	10	11
Warm Pass	-	-	x	-	-	-	x	x	-	x	x
Dayebas Creek	-	x	x	-	-	•	x	-	-	-	x
Lower Endicott	x	x	x	x	-	?	-	-	-	-	-
Berners-Lace River	-	x	-	-	-	x	-	-	-	-	-
Katzehin River	-	-	x	-	-	-	-	x	-	-	-
COAST RANGE PROVINCE	1	2	3	4	5	6	7	8	9	10	
(Limestone Inlet)	-	x	x	x	x	-	-	-	-	-	
(Cape Fanshaw)	-	x	-	•	-	-	-	-	-	-	
(Red River)	-	x	x	x	-	x	-	•	-	-	
Blue Lake Lava	-	x	x	-	x	x	•	-	-	-	
Martin River	-	-	-	-	-	-	-	-	-	-	
Robinson Lake	x	x	x	-	x	x	-	-	-	-	
Twin Lakes	-	x	x	-	x	-	-	-	x	•	
Anan Creek	x	x	x	-	x	x	-	-	-	-	
Yehring Creek	-	x	x	-	x	-	-	-	-	x	
S. Fork Chickamin	-	-	-	-	-	-	-	-	-	-	
N. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9	10	
Crater Ridge-Fred Creek	x	x	x	x	x	-	-	x	-	-	
Myriad Islands	-	-	-	-	-	•	?	-	-	-	
Plotnikof-Pt Banks	x	x	x	x	x	x	?	-	-	-	
Lake Eva	x	x	x	x	-	-	-	-	-	-	
Redoubt Lake	-	x	-	x	-	-	-	-	-	-	
Lover's Creek	x	x	x	x	x	-	-	-	-	-	
N. INTERIOR ISLANDS PROVINCE	1	2	3	4	5	6					
(Pack Creek)	x	x	x	x	x						
Chaik Bay	•	x	x	x	x						
Gambier Bay	x	•	x	x	x						
Tiedeman Island	x	x	-	-	-						
Pleasant Island	x	x	-	x	x						
Upper Tenakee Hot Sp	-	x	x	x	-	•					
Swan Cove	x	x	x	x	-						
Tonalite Creek	•	x	x	x	x						

TABLE 3-107 (CONTINUED)
SUMMARY OF HOW THE EXISTING RNA's AND THE POTENTIAL RNA PROPOSALS FILL THE VEGETATION CELL TYPES. 1/

Existing RNA's and Potential Proposals	Vegetation Cell Type 2/												
C. INTERIOR ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9	10	11	12	
Bailey Bay	x	x	-	-	x	x	x	-	-	-	-	*	
Falls Creek Windthrow	-	x	-	x	-	-	-	-	-	*	-	-	
Kadin Island	-	x	-	-	-	-	-	-	-	-	*	-	
Port Camden Fossil	x	x	-	-	-	-	x	-	-	-	-	-	
South Etolin Island	x	x	x	-	x	*	x	x	-	x	-	-	
Duncan Salt Chuck	-	x	-	-	x	x	x	-	-	-	-	-	
West Duncan Uplift	-	x	-	-	*	x	x	-	-	-	-	-	
McDonald Lake	x	x	x	-	-	?	-	-	-	-	-	-	
S. OUTER ISLANDS PROVINCE	1	2	3	4	5	6	7	8	9	10	11	12	13
(Dog Island)	-	x	x	-	x	-	-	-	-	-	-	*	-
(Old Tom Creek)	x	x	x	x	x	-	-	-	-	-	-	-	-
Disappearance Creek	x	x	x	x	?	-	-	x	-	-	-	-	-
Johnson Lake	*	x	x	x	x	-	-	-	-	-	-	-	-
Mount Calder-Virginia Mtn	-	x	x	x	x	-	-	-	-	*	x	-	-
Sarkar Lakes	-	x	x	-	x	-	-	-	-	-	-	-	-
Thunder Mountain	x	x	x	x	x	x	-	-	?	?	*	-	-
Hunter Bay-Biscuit Lagoon	-	x	x	-	-	-	-	-	-	-	-	-	-
Klakas Lake	x	x	x	-	-	-	-	-	-	-	-	-	-
S. Sumez-Angel Falls													

Source: Juday et al, 1988 and RNA Steering Committee.

1/ An "x" indicates that an area has at least a minimal representation of the cell type. An "*" indicates that an area has an exceptional example of the cell type. A "?" indicates possible representation of the cell type. Parenthesis ( ) around the RNA name represent already established RNA's.

2/ Vegetation cell type numbers refer to the numbers for each cell type presented in Table 3-100.

TABLE 3-108

SUMMARY OF HOW THE EXISTING RNA's AND THE POTENTIAL RNA PROPOSALS FILL THE WILDLIFE CELL TYPES.

Wildlife Cell Types 1/

Existing RNA's and Potential Proposals	Riparian Spruce 1	Hem Mix Hem/ Spr 2	Hem Low Volume 3	Alpine Subalp 4	Wet-land 5	Beach 6	Est-uary 7	Decid Shrub 8	Small Island 9	SPECIES CELL TYPES 2/
YAKUTAT PROVINCE										
Akwe Beach	X				X			X		1.2.6.21
Akwe-Ustay Lakes	X				X			X		1.2.6
Mountain Lake			X	X	X					
Pike Lakes			X		X					6.23
Upper Situk River								X		1.2.6-9.21.23
Lost River								X		1.2.6-9.21.23
LYNN CANAL PROVINCE										
Warm Pass			X	X						1.5.6
Dayebas Creek			X	X				X		5
Lower Endicott River	X		X	X		X	X2	X		Corridor to Glacier
Berner's-Lace Rivers	X		X	X	X		X3	X		1.5.6.8.9
Katzehin River			X	X			X2	X		5
COAST RANGE PROVINCE										
Limestone Inlet (existing RNA)		X	X	X		X	X3			
Cape Fanshaw (existing RNA)			X							
Red River (existing RNA)		X	X	X		X	X3			
Blue Lake Lava		X	X	X				X		
Martin River	X		X	X				X		1.5.7.8-11.13.14
Robinson Lake	X		X	X	X					5.8
Twin Lakes			X	X	X			X		1.2.5-9.15.16.24.26
Anan Creek	X	X	X	X	X					9
Yehring Creek				X	X			X		5.24
S. Fork Chickamin										
N. OUTER ISLANDS PROVINCE										
Crater Ridge-Fred's Cr.		X	X				X			
Myriad Islands							X2		X	2.15.19
Plotnikof-Port Banks	X			X	X	X				
Lake Eva	X	X	X				X			
Redoubt Lake	X	X	X	X		X				
Lover's Creek				X						

TABLE 3-108 (CONTINUED)
SUMMARY OF HOW THE EXISTING RNA's AND THE POTENTIAL RNA PROPOSALS FILL THE WILDLIFE CELL TYPES.

Existing RNA's and Potential Proposals	Wildlife Cell Types 1/ Riparian Spruce 1	Hem Mix Hem Hem/ Spr 2	Low Volume 3	Alpine Subalp 4	Wet- land 5	Beach 6	Est- uary 7	Decid Shrub 8	Small Island 9	SPECIES CELL TYPES 2/
N. INTERIOR ISLANDS PROVINCE										
Pack Creek (existing RNA)	X	X	X	X		X	X3			1,3,4,15
Chaik Bay	X	X	X	X	X	X	X3			1-4,7,10-16
Gambier Bay		X	X		X	X	X3			1-4,15,18
Tiedeman Island		X	X		X	X				1-4,7,15,16,18
Pleasant Island		X	X		X	X				2,3,4
Upper Tenakee Hot Spr.			X			X	X1			
Swan Cove	X	X	X	X		X	X3			1-4,15
Tonalite Creek	X	X	X		X	X	X3			1,3,4,7,10-12,14,15
C. INTERIOR ISLANDS PROVINCE										
Bailey Bay		X	X	X						
Falls Creek Windthrow		X								
Kadin Island						X			X	2
Port Camden Fossil						X				7,9
South Etolin Island		X				X				
Duncan Salt Chuck		X	X		X	X	X			2,4,8,9
West Duncan Uplift			X		X	X	X3			
McDonald Lake		X	X	X	X				X	1,2,5,7-15,22
S. OUTER ISLANDS PROVINCE										
Dog Island (existing)			X			X			X	
Old Tom Creek (existing)			X		X	X	X			8
Disappearance Creek	X	X	X		X	X	X			2,3,9
Johnson Lake	X	X	X	X	X					8
Mt.Calder-Virginia Mtn			X	X						
Sarkar Lakes	X	X	X		X					3,4,7-9,15,18,21,22.
Thunder Mountain	X	X	X	X	X	X	X1			
Hunter Bay-Biscuit L.		X	X		X	X				2,3,7-12,15,21,22,25, 28,34
Klakas Lake	X	X	X				X			2,3,7-12,14,15,22,25, 28,34
South Sumez-Angel Falls										35

Source: Juday et al. 1988 and RNA Steering Committee

1/ Wildlife Cell Types: 1 = Riparian Spruce Habitat; 2 = High to Moderate Volume Upland Hemlock and Mixed Hemlock/Spruce Habitats; 3 = Low Volume Upland Hemlock and Mixed Hemlock/Spruce Habitats; 4 = Alpine and Subalpine Habitats; 5 = Wetland Habitats; 6 = Beach Fringe Habitats; 7 = Estuary Habitats (three general types of estuary habitats were recognized: elymus types, sedge types, meadow types; an X1 indicates one type present, X2 indicates two types present, X3 indicates 3 types present, X indicates types unknown); 8 = Deciduous Shrub Habitats; 9 = Small Islands.

2/ Species Cell Type numbers refer to the numbers for each species as listed in Table 3-101.

TABLE 3-109

SUMMARY OF HOW THE EXISTING RNA's AND THE POTENTIAL RNA PROPOSALS FILL THE AQUATIC CELL TYPES.

Existing RNA's and Potential Proposals	General Watershed Cell Types 1/ 1	2	3	4	5	6	7	SPECIFIC CELL TYPES 2/
YAKUTAT PROVINCE								
Akwe Beach	X						X	2,7,12,13,15,42,50,53,56a,61
Akwe-Ustay Lakes 3/		X						7,12,13,15,17,23,40,42,49,50,53,56a
Mountain Lake				X				6,9,10,12,13,17,17a,39,49
Pike Lakes	X							5,7,13,14,24,50,54
Upper Situk River	X							6,8,13,17A,37,38,40,42,45,47,50,53, 56abc, 57
Lost River	X							34,42,45,56a,57
LYNN CANAL PROVINCE								
Warm Pass			X					1,8,14,18,40,42
Dayebas Creek					X			1,6,8,14,18,42,51,59
Lower Endicott River		X	X					42,58
Berner's-Lace Rivers		X						40,42,56b,58,38
Katzehin River		X						40,42,58
COAST RANGE PROVINCE								
Limestone Inlet (existing RNA)			X					1,6,18,19,40
Cape Fanshaw (existing RNA)				X	X			
Red River (existing RNA)			X					
Blue Lake Lava								
Martin River								
Robinson Lake								27
Twin Lakes		X						9,13,41,53,55,7,39,38,50,56a
Anan Creek			X	X				52,56b,1,6,13,19,38,39,42
Yehring Creek		X						40,42,50,53,56b,56c
S. Fork Chickamin								
N. OUTER ISLANDS PROVINCE								
Crater Ridge-Fred's Cr.								13,14,25,31,42,48
Myriad Islands								no streams
Plotnikof-Port Banks				X				1,6,12,13,15,18,19,35,41,43,48
Lake Eva			X	X				1,6,9,10,13,15,17,19,39,40,41,42,53, 56b
Redoubt Lake			X					3,9,10,12,13,17,32,41,42,49,55
Lover's Creek					X			39,42,59
N. INTERIOR ISLANDS PROVINCE								
Pack Creek (existing RNA)			X					40,42,57
Chaik Bay			X					40,42,52,56b
Gambier Bay			X					40,42,53,52,56b
Tiedeman Island					X			40,42
Pleasant Island					X			40
Upper Tenakee Hot Spr.			X					18,33,40,42,52,56b,57
Swan Cove								
Tonalite Creek			X					33,40,42,52,56b,57

TABLE 3-109 (CONTINUED)
SUMMARY OF HOW THE EXISTING RNA's AND THE POTENTIAL RNA PROPOSALS FILL THE AQUATIC CELL TYPES.

Existing RNA's and Potential Proposals	General Watershed Cell Types 1/ 1	2	3	4	5	6	7	SPECIFIC CELL TYPES 2/
C. INTERIOR ISLANDS PROVINCE								
Bailey Bay								
Falls Creek Windthrow			X					
Kadin Island					X			58
Port Camden Fossil						X		42
South Etolin Island						X		7,9,13,21,39,41
Duncan Salt Chuck						X		40,42,56b,57,22
West Duncan Uplift							X	62,7,21
McDonald Lake								
S. OUTER ISLANDS PROVINCE								
Dog Island (existing)								
Old Tom Creek (existing)							X	
Disappearance Creek				X				30,56b
Johnson Lake			X					13,15
Mt.Calder-Virginia Mtn								
Sarkar Lakes						X		13,15,49,53,55
Thunder Mountain								
Hunter Bay-Biscuit L.								
Klakas Lake								
South Sumez-Angel Falls								

Source: Juday et al. 1988 and RNA Steering Committee
1/ General Aquatic Cell Types: 1 = Active Glacial Outwash Plain/Watershed; 2 = Active Glacial Mainland Valley; 3 = Alluvial "U"-Shaped Valley with Steep Side Slopes; 4 = Rock Basin Lake Systems; 5 = Steep Streams (Mountain Slope) Terminating in Salt Water; 6 = Alluvial, Low Gradient, Rolling Topography (Rolling Ground Moraine); 7 = Raised Marine Terrace with Marine Clays
2/ Specific Cell Type numbers refer to the numbers for each type as listed in Table 3.
3/ Akwe Lake is a clear water, former pro-glacial lake; Ustay Lake is a pro-glacial lake.

The following narratives briefly describe each priority and other recommended potential candidate RNA proposal.

YAKUTAT FORELANDS GEOGRAPHIC PROVINCE

PRIORITY POTENTIAL CANDIDATE PROPOSALS

1. Akwe Beach

LUD (2 &) 3
Yakutat Ranger District

Akwe Beach contains a representative outer coast and beach segment of the Yakutat Forelands, the only extended length of sandy beach in most of south coastal Alaska. The characteristic alternating dune ridges and low wetlands (swales) of the area are believed to be geologically very recent, perhaps only 2,000 years old. Strong storms and currents of the North Pacific are still building or modifying the beach environments, creating a specialized niche for dune plants, plant communities, shorebirds, marine mammals, and other wildlife.

Akwe Beach is proposed in order to include coastal dune formations, old stabilized dunes and their vegetation, and swale wetlands plant communities. The dune ridges and swales are thought to be progressively older from the coast inland. A large freshwater lake, Triangle Lake, adds important diversity to the RNA proposal. Potential uncommon plant species include Atriplex drymarioides, Lysimachia thyrsiflora, and Saussurea americana. Significant wildlife habitats include freshwater wetland staging areas for migratory birds, and productive estuary. The area is within the range of moose and the glacier phase of the black bear.

2. Akwe-Ustay Lakes

LUD 2
Yakutat Ranger District

This area is proposed to include two low elevation lakes at the base of the mountain front overlooking the Yakutat Forelands. Akwe Lake receives relatively small amounts of glacial sediment and is fed predominantly by rainwater runoff and groundwater. Ustay Lake is in contact with the terminus of Rodman Glacier and is cloudy with glacial sediment. The two lakes are especially suited for comparative hydrological studies.

The area offers the opportunity to study new alpine plant communities that have developed where glaciers have retreated in the Yakutat area's recent geologic past. The alpine zone on the mountain knob separating the two lakes may include a glacial refugium of higher plant diversity and should be searched for Stellaria crassifolia, Stellaria ruscifolia, Gentiana aleutica, Veronica stelleri, Castilleja chrymactis, and Euphrasia mollis. Low elevation wetlands should be searched for Pedicularis macrodonta. Other features of interest are black cottonwood forest and tall willow shrub plant communities.

3. Mountain Lake

LUD 1
Yakutat Ranger District

This area encompasses elevations above and below the flooding zone that forms when Hubbard Glacier blocks Russell Fiord and converts it to Russell Lake. When the lake fills to about 150 feet elevation it spills into drainages leading south across the Yakutat Forelands into the Pacific Ocean. The southern portion of the area includes the upper portion of one of these outlets leading to Situk Lake.

Areas below the floodline are covered with a maturing Sitka spruce forest that developed on a former lake bottom sometime after 1150 AD when Hubbard Glacier began its retreat from Yakutat Bay. In 1986, an ice dam temporarily formed and partially flooded the fiord, killing vegetation that was underwater for more than 2 weeks. The ice dam is forming again and may burst as in 1986 or it may stabilize and make the lake permanent.

Low elevation slopes above the floodline support old-growth western hemlock-Sitka spruce forest which is relatively restricted in this part of Southeast Alaska. The area encompasses Mountain Lake, a narrow elongate lake carved into bedrock in a direction parallel to the flow of ice when it filled Russell Fiord. Alpine zones in the area may have been a glacial refugium, and should be searched for <u>Stellaria ruscifolia</u>, <u>Veronica stelleri</u>, <u>Castilleja chrymactics</u>, and <u>Euphrasia mollis</u>.

4. Pike Lakes

LUD 4
Yakutat Ranger District

Pike Lakes are the only lakes in coastal Alaska south of the Alaska Range that are inhabited by northern pike. It is not known how this interior fish species reached the area. The area also includes one of the only coastal stands of the interior variety of lodgepole pine and several ice block depression lakes with different hydrological characteristics.

The area supports examples of old-growth western and mountain hemlocks, lodgepole pine, and Sitka spruce. The old-growth Sitka spruce-western hemlock forest type occurs on larger raised moraines, unlike the great majority of stands of this type in northern Southeast Alaska, which occur on steep unstable mountain slopes. Forest types that have developed on both coarse-textured well-drained soils and poorly drained organic soils are present.

The Pike Lakes RNA should be searched for special plants, especially <u>Eleocharis kamtschatica</u>, <u>Lysimachia thyrsiflora</u>, and <u>Pedicularis macrodonta</u>. The area is within the range of the glacier phase of black bear. Moose browse shrub habitat and graze on aquatic vegetation of the larger lakes. The upper reaches of streams are probably rearing habitat for sockeye salmon. The lakes are locally important waterfowl habitat.

5. Upper Situk

LUD 2
Yakutat Ranger District

This area is proposed to represent excellent moose habitat in the willows occupying the complex overflow channels of the former Russell Lake, and productive fisheries. When Hubbard Glacier dams Russell Fiord again and causes Russell Lake to spill over to the south this area will be modified again. The segment of the Situk River within the area currently contains high-quality king and coho salmon rearing habitat and supports sea-run cutthroat and fall run steelhead; it has not been stocked. The fishery could be largely destroyed during lake overflow or it may partially survive.

The area should be examined to see if it contains the uncommon plants <u>Lysimachia thyrsiflora</u>, <u>Pedicularis macrodonta</u>, and <u>Saussurea americana</u>.

OTHER RECOMMENDED POTENTIAL CANDIDATE PROPOSALS

6. Lost River

LUD 3
Yakutat Ranger District

This short river supports a late (February) run of coho salmon, offering a food resource to predators at a critical time of the year. The other features of interest are the shrub communities on the complex former Russell Lake overflow channels.

LYNN CANAL GEOGRAPHIC PROVINCE

PRIORITY POTENTIAL CANDIDATE PROPOSALS

1. **Warm Pass**

LUD 2
Juneau Ranger District

Subalpine fir has a highly restricted distribution in Southeast Alaska. It occurs mainly along a few low elevation corridors into British Columbia. Warm Pass is proposed as an RNA in order to include the northernmost example of subalpine fir in Alaska. The forests of the middle and upper portions of the valley are pure subalpine fir stands. Warm Pass Valley is the only forested portion of the US-Canada border between the Taku River and Chilkat Pass. The valley has been an important migration corridor for interior vegetative species that mix with the coastal forest and tundra. Many of the interior species are rare in the Tongass National Forest. The interior alpine species Dryas integrifolia was collected in the RNA in 1988. Other possible uncommon species that should be searched for are Carex interior, Carex atrostachya, Cypripedium montanum, Calypso bulbosa, Geocaulon lividum, Thlaspi arcticum, Viola selkirkii, Chimaphila umbellata, Phyllodoce empetriformis, Phacelia mollis, Plagiobothrys cognatus, Castilleja chrymactics, Symphoricarpus albus, Lactuca biennis, and Crepis elegans.

Warm Pass Valley has a very different climate than most of Southeast Alaska. Because of a pronounced rainshadow effect, annual precipitation is much lower than typical coastal forest and mountains; the total precipitation at nearby Skagway is only 26 inches. The low elevation connection to interior British Columbia allows cold dry air to move through the valley in the winter. Laughton Glacier and an unnamed glacier occupy two tributary valleys on the north-facing side of the Warm Pass Valley. Both glaciers have retreated significantly in the last several decades and appear to be still contracting. A considerable amount of recently deglaciated land is in various stages of plant colonization. The south-facing slopes across the valley a very short distance from the terminus of both glaciers were burned over in a forest fire. This may be the closest that forest fire and glaciers have occurred in North America.

The valley supports a good population of moose that utilize both the alpine shrub belt and riparian shrubs at lower elevations; moose trails and signs of browsing are abundant. Portions of Warm Pass Valley are used intensively by brown bear. Mountain goat inhabit the area.

Preliminary information about Warm Pass has been shared with the British Columbia Ecological Reserves Unit. RNA establishment and documentation here provide an excellent opportunity for international cooperation.

2. Dayebas Creek

LUD 2
Juneau Ranger District

Chilkoot and Chilkat Inlets at the head of Lynn Canal are funnels for cold winter winds moving down from the low passes at the northern end of Southeast Alaska; this region also has the highest summer temperatures and the least annual precipitation in Southeast Alaska. This climate is highly localized to the long steep fiord walls leading up from tidewater shores. Dayebas Creek is a short tributary valley opening onto Chilkoot Inlet or Tayia Inlet across from Haines. Dayebas Creek is proposed in order to include vegetation growing in this special climatic region including uncommon forest and tundra plants and unusual forest types. The region has served as an important migration corridor for coastal plants moving inland and interior plants moving into the coastal region. The proposed RNA also contains significant mountain goat habitat, an old hanging glacial cirque basin, periglacial features, and a large waterfall.

The lower elevations of Dayebas Creek are covered with a successional paper birch-Sitka spruce forest, one of the only areas of this unusual forest type in the Tongass National Forest. Western hemlock is slowly replacing the birch on all but the rockiest sites. Exceptionally large tree-sized Sitka willows are scattered among the paper birch-spruce stands. These stands appear to have originated from fire, which is very rare on the Tongass National Forest. Some subsequent timber harvesting took place near tidewater. Steep convex slopes have very shallow soils over bedrock that support a dry lodgepole pine-lichen forest type. A mixed subalpine fir-mountain hemlock forest occupies the highest forested elevations. This area has the greatest tree species richness outside the southern fringe of the Tongass National Forest.

Tundra communities above treeline are an unusual mixture of interior and coastal alpine types. Two plants on the list of uncommon Tongass National Forest species were collected in the area in 1988, the interior alpine species _Dryas integrifolia_ and _Diapensia lapponica_. The alpine species _Minuartia biflora_ was also collected in the area, the first collection in Southeast or coastal Alaska for this species. Identification of other specimens collected late in the 1988 field season is underway. Other possible uncommon species that should be searched for are _Carex interior_, _Carex atrostachya_, _Cypripedium montanum_, _Calypso bulbosa_, _Geocaulon lividum_, _Thlaspi arcticum_, _Rorippa obtusa_, _Viola selkirkii_, _Chimaphila umbellata_, _Phacelia franklinii_, _Plagiobothrys cognatus_, _Castilleja chrymactics_, _Symphoricarpus albus_, and _Crepis elegans_. Within the tundra containing interior plant species are frost-sorted stone nets and other periglacial features. Steep talus slopes that experience active frost heaving are rich in alpine species although the total plant cover is low.

The lowermost portion of Dayebas Creek plunges over the vertical wall of the fiord forming a large waterfall. The waterfall splashes directly into saltwater. The tidewater shoreline of the area runs almost directly north and south except for a short east-west segment immediately south of the waterfall. The short east-west ridge is bathed in spray rising vertically from the splash zone of the waterfall and is covered in a lush growth of mosses and lichens which should be searched for unusual species.

Lush alpine meadows that have not been recently glaciated provide excellent mountain goat foraging habitat. Evidence of goat grazing is abundant and at least two bands of goats were seen during the 1988 site visit. The area has other important features of goat habitat including cliffs that serve as escape

terrain and easy access to both high elevation summer habitat and low elevation winter habitat.

OTHER RECOMMENDED POTENTIAL CANDIDATE PROPOSALS

3. Lower Endicott River

LUD 1
Juneau Ranger District

Endicott River served as an outlet for glacial meltwater flowing eastward from Glacier Bay when the Grand Pacific Glacier filled the bay 200 years ago. As the glacier thinned and retreated, a low ridge at the head of Endicott River (Endicott Gap) emerged and rerouted the water and cold air southward down Glacier Bay. Vegetation of the Endicott River watershed has thus developed under both ice-affected and ice-free conditions during the last several centuries. The lower watershed is at the edge of the special northern Lynn Canal climate of drier and more continental conditions.

The interior alpine species Dryas integrifolia has been collected in the vicinity. Cypripedium montanum, Chimaphila umbellata, and Euphrasia mollis have been collected across the divide in Glacier Bay National Park. Lactuca biennis has been collected north of the RNA near Davidson Glacier. Other possible uncommon species that should be searched for are Carex interior, Carex atrostachya, Thlaspi arcticum, Viola selkirkii, Castilleja chrymactics, and Crepis elegans. The distribution of these species in the lower Endicott River watershed is not well understood, and additional collections are needed. The William Henrey Mountain area appears to have the highest potential for the uncommon plants.

This area offers the opportunity to conduct watershed studies, especially the development of aquatic and riparian ecosystems in relation to glacial outwash events. The area also contains western hemlock-Sitka spruce forest communities typical of the northernmost portions of the Tongass National Forest. This proposal is entirely within designated wilderness. A future possible road connection route between Haines and Juneau may access the lower Endicott River drainage outside of the Wilderness; such access may improve research opportunities for this area. Future road access will require more intensive management to maintain the qualities of the area as an RNA.

4. Berners-Lace River

LUD 2
Juneau Ranger District

The Berners-Lace River RNA proposal is designed to encompass two contrasting low elevation major river segments and associated ecosystems. The Lace River floodplain is a poorly vegetated, braided river channel that is typical of glacially-fed rivers. Sediment from glacial meltwater builds up on the bed of the river faster than the river can transport it away. The active river channel eventually becomes higher than the surrounding landscape and during a high water event (sometimes a prolonged period of warm, dry weather that causes high glacial melt) the river spills over into surrounding lower terrain and abandons the old channel. This process has formed a typical broad, meandering, and poorly vegetated glacial floodplain at Lace River.

Berners River received great volumes of meltwater from the glacier flowing south off Sinclair Mountain, until the glacier retreated far enough to expose a low bedrock divide at the head of Berners River valley. The entire meltwater flow

has since been routed down the Lace River drainage. Berners River is now a classic underfit river, one that is considerably smaller than that of the flow regime that formed its valley.

The continued buildup of sediments at the mouth of Lace River in upper Berners Bay is damming up the mouth of Berners River. As a result, the broad floodplain of Berners River is a very large and dynamic wetland complex. Vegetation of the Berners valley is predominantly submerged and emergent aquatic plants with fringing freshwater sedge marshes. The valley is prime moose, waterfowl, and furbearer habitat. The sloughs and lakes connected to the Berners River channel are excellent anadromous fish habitat. Several well-worn trails along the sides of the valley and other sign attest to a large population of brown bear.

The vegetation of Berners River valley suggests that a rise in water level from the damming action at the mouth of the river continues. Shrubs that once occupied raised levees are now being drowned, and extensive areas of floating mat vegetation occupy the valley. As a result, unlike much freshwater wetland vegetation in Southeast Alaska, the Berners River wetlands are being renewed and are not degenerating into acidic muskegs with low wildlife productivity.

A young cottonwood forest occupies point bars along the active channel of the Berners River floodplain. Slopes on either side of the valley are covered with a northern variant of western hemlock-Sitka spruce forest types.

5. Katzehin River Meadows

LUD 2
Juneau Ranger District

As one travels north along Lynn Canal, Katzehin River is the last major river flowing west from the mainland before the special climatic zone at Skagway. An RNA is proposed here to include productive and species-rich alpine and subalpine meadow communities, treeline mountain hemlock sites, and a northern example of western hemlock-Sitka spruce communities. The area contains extensive summer grazing habitat for mountain goats. Goat trails, terraces, and droppings are widespread and goats are consistently observed in the area during the summer.

Treeline plant communities include a mountain hemlock-copperbush (Cladothamnus pyrolaeflorus) open woodland. Extensive Lutkea pectinata patches cover talus and semi-stabilized boulders. Shallow depressions collect thick snowbanks and are species-poor, mainly a Phyllodoce aleutica-Cassiope mertensiana community. Meltwater coming off persistent snowbanks however produces a snowbank community that is rich in herbs, including species of Saxifraga, Valeriana, Campanula, Anemone, and Viola. Above treeline are an open grass and sedge subalpine meadow. Species that are common there include Carex nigricans, Luzula parviflora, Deschampsia caespitosa, Phleum commutatum, and Trisetum spicatum.

Western hemlock-Sitka spruce forest types occupy the lower elevation slopes. Forests on the south-facing slopes above Katzehin River are especially large and well developed for a site so far north in the Tongass National Forest. The north and west-facing slopes of the RNA are especially steep and broken by cliffs even though there is a nearly complete forest canopy. Where groundwater moves over the cliffs and steep slopes by sheet flow, a Sitka spruce/devil's club forest type occurs.

The lowermost portion of the area includes a section of the braided channel of the Katzehin River. Sediment from meltwater at the terminus of Meade Glacier is

causing the Katzehin River to aggrade or build up its bed. The active river channel has shifted frequently, and most of the floodplain is in very early vegetative succession. Even though total plant cover is low on the floodplain, a distinctive set of species is found in the open and changing habitat. The terminus of Meade Glacier has retreated and thinned considerably in the last several decades, but a minor readvance of only a few kilometers would bring it to the edge of the RNA.

COAST RANGE GEOGRAPHIC PROVINCE

PRIORITY POTENTIAL CANDIDATE PROPOSALS

1. **Blue Lake Lava**

LUD 1
Misty Fiords National Monument

This proposed RNA is located along the US-Canada border and contains a recent lava flow that originated in British Columbia. Because of its southerly location and connection to a valley leading into British Columbia, the area may contain some plant species uncommon on the Tongass National Forest and stands of subalpine fir. The area is also proposed in order to obtain examples of mountain hemlock forest types on soils not affected by the recent lava flows. The British Columbia Ecological Reserves Unit has been informed of the RNA proposal and are interested in international cooperation.

A radiocarbon sample of a log at the surface of the lava was dated at 360 plus or minus 60 years. Two other flows overlap the main, dated flow. Their form as well as younger vegetation on them suggest that there were two periods of volcanic activity more recent than 360 years ago. The lava flows contain smooth, ropy "pahoehoe" surfaces and blocky "ah-ah" deposits. Isolated "islands" of forest surrounded by recent lava called steptoes are present. A cone near the lower end of the flow probably represents a secondary vent. Lava contraction (from cooling) features such as drainage gutters and circular pits occur in the area, too. The area should be searched for lava tube caves.

The volcanic vent is 5 kilometers north of the U.S. border in British Columbia. The vent erupted laterally near the terminus of a small valley glacier. The flows moved south 12 kilometers down Lava Fork River, continued across the border and spread into a fan at the confluence with Blue River, damming it to form Blue Lake. The lake gets its name from the blue or aquamarine color of the water that is caused by the Tyndall effect; light is refracted on the suspended clay particles in the water. The lava continued south about 9 kilometers down Blue River valley and then stopped. There are numerous small ponds on the lava surface where water has filled depressions.

Plant succession has been relatively rapid on the lava because of the high rainfall environment of Southeast Alaska. Vascular plant communities have developed where fine soil particles collected on the lava. On some lava surfaces black cottonwood trees have developed an unusual growth form with multiple root crowns and adventitious roots extending from the stem out across the surface. Lush mats of moss and rich lichen beds are found on portions of the lava surface. However, most of the lava is still barren rock. The area offers the opportunity to compare rates of weathering of lava surfaces with other environments in the world, and is of special interest because of the unusual combination of cool and high rainfall conditions.

2. Martin River

LUD 1
Misty Fiords National Monument

This area would target study of riparian spruce and brown bear along a major mainland stream. The Martin River site appears to have better spruce stands than other proposed locations, avoids anticipated recreation uses, and has the added benefit of being adjacent to the existing Red River RNA. Access to Martin River can probably be by water; other proposed sites would require a helicopter.

3. Robinson Lake

LUD 1
Misty Fiords National Monument

This area is focused on a natural slump lake, forest types typical of the southern portion of mainland Southeast Alaska, and some uncommon plants of restricted distribution in Alaska that may occur in the area. Robinson Lake formed in recent years when a natural earthslide dammed Robinson Creek. The geomorphology and stream morphology of the area have been intensively studied by the Juneau Forestry Sciences Laboratory. The area extends to the shore of Behm Canal in order to include habitat diversity associated with the shoreline and proximity to deep water. Warmth given off by deep water often delays the onset of winter snows, reduces total snow accumulation at low elevations, and initiates early snowmelt in the spring.

There has been little study and documentation of terrestrial vegetation and wildlife features in the area. The area probably contains examples of the western hemlock/swordfern type, the western redcedar/swordfern type, and relatively minor amounts of riparian Sitka spruce forest. Higher elevations probably contain mountain hemlock types, and high and low elevation muskegs are present. Uncommon species of the Tongass National Forest that should be searched for in the area are Caltha biflora, Monotropa uniflora, Platanthera gracilis, Oxycoccus palustris, and Lycopus uniflorus.

4. Twin Lakes

LUD 1
Wrangell Ranger District

The Stikine River is one of the few low elevation corridors from the interior of Canada that reaches the coastal forest region of Southeast Alaska. The river carries a heavy glacial sediment load and has a typical braided floodplain with much early successional shrub vegetation. The Twin Lakes area includes extensive willow stands on the Stikine floodplain that are continually renewed by the river and are excellent moose habitat. The Stikine floodplain is one of two locations in Alaska where garter snakes have been collected, probably as the result of their rafting down the Stikine River. The long-toed salamander has also been reported from the floodplain. Twin Lakes (also known as Figure Eight Lake) is located in the center of the area. The lake serves as an important coho salmon rearing habitat and supports sea-run cutthroats that overwinter there.

Two special vegetation types occur in the area. Higher terraces above the river support a tall black cottonwood forest, sometimes with a successional Sitka spruce understory. Salix interior is reported to be a dominant early successional plant on sandy river bars in this section of the Stikine River, but specimens to verify the report are not available. This would be the only known occurrence of Salix interior in Southeast Alaska. Slopes above the river support western hemlock forest types under the influence of down-canyon winds.

A plant new to the flora of Alaska, Angelica arguta, was reported in the Kakwan Point area; specimens in flower should be collected and checked carefully against A. lucida and genuflexa. Cardamine pratensis was reported in the RNA near Twin Lakes, a significant southern range extension for this species. Limosella aquatica and Listera convallarioides were reported in Southeast Alaska for the first time in the Kakwan Point area. Specimens for all these reports should be collected and, if verified, should be preserved in Alaska herbaria. The uncommon plant Lysimachia thyrsiflora has been collected in wetlands south of the mouth of the Stikine River and should be searched for in the RNA. Other uncommon plant species that may occur are Nymphaea tetragona, Caltha biflora, Soiraea douglasii, and Mimulus lewisii.

A low-grade geothermal system occurs in the area. Two tepid springs issue from host rock just a few meters above the level of Twin Lakes on its northwest shore. One spring emerges from boulders at the base of an avalanche chute. The other spring emerges from alluvium at the base of a cliff. Bedrock in the immediate vicinity of the springs is a foliated, medium-grained quartz diorite. During high water stages on the Stikine River, the water level of the lake is raised, possibly flooding the springs.

One geothermal spring has a reported summer temperature of 21 degrees C, the other a temperature of 18 degrees C. Summer temperature of the springs may be lower than the winter temperature; a reading of 26 degrees C was obtained one winter. Cold surface water flows more readily down a cliff face above the springs during the warm season, diluting the heated water. Total dissolved solids and silica content are low as would be expected in a low-grade geothermal system, although magnesium content is relatively high. There are no hydrothermal deposits. The waters of the springs have a neutral pH.

Relatively "high" amounts of recreation use occur in conjunction with a cabin and the lakes. RNA establishment would require coordinated management and monitoring to maintain the qualities of the RNA.

OTHER RECOMMENDED POTENTIAL CANDIDATE PROPOSALS

5. Anan Creek

LUD 2
Wrangell Ranger District

Anan Creek is designed to include a watershed with an exceptional fishery and concentration of bears. Anan Creek supports a particularly productive pink salmon fishery; the long-term mean escapement is 200,000 pinks, one of the largest salmon runs in all of Southeast Alaska. Chum, chinook, coho, and sockeye salmon, and Dolly Varden char, steelhead, and cutthroat trout are also present. Anan Creek has gravels of the ideal size for spawning salmon, a constant flow of very clean water, and very low content of fine particles that clog the circulation of oxygen-rich water through spawning beds. Anan Creek plunges over two waterfalls in its lower section between Anan Lake and Bradfield Canal. The first (lower) waterfall is passable, but an obstacle to salmon migrating upstream to the extensive spawning habitat of Anan Creek and Anan Lake and Boulder Lake. A fish ladder in a tunnel has been installed on the first falls. The second falls delays fish passage and is about 2 meters high.

The largest known concentrations of black bear in the Tongass National Forest gather here to fish for salmon; as many as 50 different black bears have been

counted at the falls during a period of several days at the peak of salmon migration. Two bear observation stations have been constructed near the two waterfalls. The abundance of fish schooled up at the base of the falls, or leaping through the obstacles attract the black bears. Despite the heavy black bear use of the area, brown bear are not uncommon on Anan Creek. Beaver are also abundant and a series of beaver ponds and channels are found above the falls.

6. Yehring Creek

LUD 2
Juneau Ranger District

The Taku River is one of the few low-elevation corridors into interior British Columbia from coastal Alaska. Plant species have used this corridor as a migration route resulting in some interesting forest and tundra types. This area is proposed in order to include a short tributary stream to the Taku River that supports productive fisheries and a representative sample of plant communities along the river corridor. Yehring Creek is a rearing habitat for coho and sockeye salmon, and supports sea-run cutthroats and spring runs of steelhead. This stream has not been artificially stocked so the fish are native genotypes.

Taku Glacier blocked and dammed Taku River until the last few centuries. Recent measurements of ice volume and movement in the Juneau Icefield suggest that the Taku Glacier is in an active building phase and will dam the river again relatively soon. The lower portion of the RNA would probably be flooded when the ice dam forms. Fish populations and habitat of the entire Taku River watershed would be drastically affected by the formation of an ice dam and blockage of access to saltwater.

Subalpine fir has been collected on the outwash of Wright Glacier in the northern portion of the area along the Taku River lowlands. Extensive black cottonwood forest stands are found along the Taku River floodplain. Mountain hemlock forest types are typical of the upper slope forests in the area. Total forest cover is low because most of the area has a north-facing aspect and much of this steep watershed basin is above 500 meters in elevation. Viola selkirkii, a rare plant species in Alaska, may occur in the RNA and has been collected nearby.

NORTHERN OUTER ISLANDS GEOGRAPHIC PROVINCE

PRIORITY POTENTIAL CANDIDATE PROPOSALS

1. Crater Ridge-Freds Creek

LUD 3
Sitka Ranger District

This area has been proposed in order to include examples of several major volcanic landforms and a small watershed under the unique hydrologic influence of volcanic ash soils. The area has been the subject of intensive study both from the standpoint of soils morphogenesis and ecosystem succession (Klinger, 1988) and geologic studies (Dave Brew, Jim Riehle, U.S. Geological Survey).

Crater Ridge is a caldera (collapsed volcanic summit) on a subsidiary volcanic cone 3 kilometers northeast of Mount Edgecumbe. Crater ridge is a composite dome (made up of lava flows alternating with ash) and stands about 500 meters in elevation. Two small lakes currently occupy a minor portion of the floor of the caldera although some volcanic deposits suggest that an eruption once took place in a large caldera or "crater" lake. The profiles of Mount Edgecumbe and Crater

Ridge are smooth and symmetrical, evidence that they were not carved by glaciation and thus were erupted since the end of the last Ice Age 14,000 years ago. Radiocarbon dates indicate that the various volcanic layers were erupted over a time period lasting a few hundred to 2,000 years, just prior to 9,000 years ago. A relatively thin ash layer was laid down in one or two later and final eruptions about 5,000 years ago. Buried trees and soil indicate that forest vegetation was well developed on the volcano before the final eruption. The south Kruzof volcanic field contains tholeiitic basalt and younger calcalkalic flows and pyroclastic rocks. The volcanic activity on Kruzof is of particular interest as it is related to plate movements and the complex process of terrain accretion which occurred during the late Cretaceous and early Tertiary time, and subsequent crustal movements.

Freds Creek drains the east slope of the crater summit. This watershed from summit to tidewater will allow studies of the influence of recent volcanic ash on stream flow regime and water chemistry. Porous ash soils can store large volumes of water and releases it steadily so that it stabilizes stream flow and temperatures.

Important forest types in the area include western hemlock and riparian Sitka spruce; both are growing on special soils which may produce variants of the "typical" forest type. Small areas of western hemlock/Alaska-yellow cedar and, muskeg occur in the area also. Agrostis thurberiana, a wetland grass species on the list of uncommon Tongass National Forest plants, has been collected in the vicinity and should be searched for in the area. The area is also at the northern limit of salal (Gaultheria shallon). Klinger (1988) describes in great detail a transect from near sea level to high elevations on Mt. Edgecumbe including information on soils chemistry, forest composition, age, and structure. His data have been used to propose his controversial ideas relating to the role of Sphagnum mosses in bog formation and forest decline, with its implications for atmospheric chemistry. Long-term protection and monitoring of these sites could eventually test whether these hypotheses explain the natural successional processes occurring over this complex terrain.

Recreation is an important use of the Crater Ridge-Fred's Creek area. There is a public recreation cabin, and the Mount Edgecumbe National Recreation Trail. RNA establishment would require close coordination with recreation administration to maintain the RNA qualities.

2. Myriad Islands

LUD 1
Sitka Ranger District

Myriad Islands are a set of numerous wave-battered, low elevation islands fronting the open North Pacific Ocean in the West Chichagof-Yakobi Wilderness. An RNA is proposed here to include islands of all sizes demonstrating biogeographic effects due to size and isolation from Chichagof Island, probable nesting habitat of the marbled murrelet, and the Sitka spruce/Pacific reedgrass forest type. The degree of isolation from Chichagof Island is unknown as some islands are only 1/4 mile from Chichagof and Herbert Graves Islands. Marten, an introduced species to islands in Southeast Alaska, is present on Chichagof and Herbert Graves Islands, but their absence or presence on the Myriad Islands is unknown. Cooperation with the State of Alaska would allow the establishment of a reserve on adjacent intertidal and subtidal habitats that are closely linked with island ecosystems: Rich kelp forests, shellfish beds, and populations of sea otters are important features of the state tidelands.

This area is free from local and regional sources of air pollution; winds arriving at the area have been cleansed by a long passage over the North Pacific Ocean. The area would make an excellent global background air quality monitoring site. It represents one of the most outstanding opportunities to study island biogeographic effects in north temperate marine and terrestrial ecosystems in the National Forest system. The islands are popular with ocean kayakers.

3. **Plotnikof-Port Banks**

LUD 2
Sitka Ranger District

This area is proposed to include an oligotrophic rock basin lake system with high fisheries diversity, riparian Sitka spruce, western and mountain hemlock types, Alaska yellow-cedar, and muskegs. Two uncommon plants of the Tongass National Forest that may occur in the area are Poa leptocoma and Stellaria crassifolia.

Ice Age glaciers carved the southern portion of Baranof Island into a series of parallel northeast-southwest trending fiords and U-shaped valleys. Port Banks is a fiord-like inlet that runs perpendicular to the orientation of most of the fiords of the island. Upstream from Port Banks the glacial U-shaped valley connected to it curves back to the general orientation of the island's fiords. The valley is occupied by two large lakes, Plotnikof and Davidof. Davidof Lake is a low elevation hanging cirque basin lake in the upper watershed. The watershed supports a summer run of steelhead, coho salmon rearing habitat in the lakes, an early run of coho, and overwintering populations of sea run cutthroat or Dolly Varden.

The lower segment of the area contains shoreline along Whale Bay and some exposed open coast of the North Pacific.

The Chatham Area indicates there is "intense" recreational interest in the Plotnikof-Point Banks area. Two public recreation cabins and trails are present in the area. The fisheries resources were probably modified through some past management activities.

OTHER RECOMMENDED POTENTIAL CANDIDATE PROPOSALS

4. **Lake Eva**

LUD 2
Sitka Ranger District

The Lake Eva area is proposed to represent a highly productive sockeye fishery with an active history of research (Robert Armstrong's classic studies of arctic char, for example). Forest types present are typical spruce and hemlock, which have potential to serve as baseline monitoring sites for adjacent managed areas. Logging activity began in nearby watersheds in the 1960' and 70's. Lake Eva is a low elevation (less than 70 meters above sea level) valley morainal lake. The lake is about 3 kilometers long by 0.5 kilometers wide. The features present in the Lake Eva RNA partially overlap the proposed Plotnikof-Port Banks RNA. Lake Eva is much better studied than Plotnikof-Port Banks and it is more accessible to researchers. However, regional direction for RNA's requires that features that can be found in LUD 1's (designated Wilderness Areas) be selected in preference to other more intensive land uses. Plotnikof-Port Banks is a LUD 1 and Lake Eva is designated LUD 2. A public recreation cabin, two shelters and a trail constructed in the 1930's by the Civilian Conservation Corps exist in the area.

5. Redoubt Lake

LUD 2
Sitka Ranger District

Redoubt Lake is one of the only large meromictic lakes in the Tongass National Forest. Meromictic lakes are characterized by a stable bottom layer that does not mix or "turn over" during the fall when cooling surface waters sink. This sinking action or annual flushing is important in aquatic ecosystems because it brings nutrients back up from the depths into the upper layers where they are available for use by photosynthetic organisms.

The factor responsible for the meromictic character of Redoubt Lake is the presence of a marine saltwater layer at the bottom of the lake. The surface of Redoubt Lake is only slightly above sea level and the lake is separated from Redoubt Bay only by a bedrock sill at the outlet. High tidal or storm surges push saltwater over the sill. Saltwater is more dense than the freshwater of the lake and settles to the bottom no matter what the temperature.

The saltwater/freshwater density-stratified water column represents a chemocline. Once in place the salt layer is generally stable and will not allow mixing. Nutrients contained in dead organisms filtering to the bottom are trapped in bottom sediments and subtracted from the ecosystem. However, freshwater springs seeping through fractures in bedrock may enter the bottom of the lake and gradually degrade the chemocline by dilution until it is renewed by saltwater intrusion. In some situations meromictic lake systems have been reported to act as effective concentrators of solar energy in the unmixed bottom layer, producing unusually warm temperatures at the bottom. Redoubt Lake offers the opportunity to conduct studies of these physical and ecological phenomena.

The watershed of Redoubt Bay has a history of some logging dating back to Russian colonial times. Present management on adjacent State Lands may have an affect on this area. The watershed has been stocked with game fish and the lake was fertilized at one time in an unsuccessful attempt to increase its productivity for game fish. Currently the Forest Service and Alaska Department of Fish and Game are experimenting with sockeye egg incubation; there may be possible future lake fertilization projects. The area contains a public recreation cabin and an administrative cabin. A hand-operated tramway has allowed small boat access to the lake; the tramway is to be reconstructed in 1990. Sport fishing use is relatively high. The area also contains a cultural site.

6. Lover's Creek

LUD 2
Sitka Ranger District

An RNA is proposed here in order to represent several phenomena associated with exceptionally high precipitation. This area is located in possibly the highest rainfall zone in North America. The official Weather Service station at Little Port Walter, a few kilometers east of the RNA, records a long-term average annual precipitation of 569 cm (224 inches); the 1987 annual total was 742 cm (292 inches). Because of orographic uplift (winds forced to rise over mountains), total precipitation in the upper elevations of the RNA is likely significantly higher.

This area contains productive fisheries, and alpine, rock and snow avalanche communities that occupy unusually low elevations. The proximity of the area to the open North Pacific and the unimpeded movement of storms into the area from the southwest probably result in a low freezing level and high snowfall total.

As a result, treeline occupies a low elevation and much of the vegetation of the steep watershed basin is alpine tundra.

The Lover's Creek area is of interest because it displays Sitka spruce-western hemlock and yellow-cedar forest types that have developed under high rainfall conditions. The area should be searched for the uncommon plants Agrostis thurberiana, Stellaria crassifolia, Rhododendron camtschaticum, and Mimulus lewisii (collected 12 kilometers to the north at Cliff Lake).

Fisheries research has occurred in this proposed area since 1934, providing possibly the longest continuous record of pink salmon production on the Pacific coast. A record of air and water temperatures and stream discharge is available from the site, as well as biological information on salmon. It has been proposed for designation as an RNA as early as 1972 by the National Marine Fisheries Service and a variety of State-wide and region-wide scientific committees.

Vegetation of this area is similar to Plotnikof-Port Banks, although the high rainfall, record of environmental data, and research history make it unique.

NORTHERN INTERIOR ISLANDS GEOGRAPHIC PROVINCE

PRIORITY POTENTIAL CANDIDATE PROPOSALS

1. Chaik Bay

LUD 1
Admiralty Island National Monument

The significance of high-productivity, low-elevation riparian Sitka spruce habitat for a variety of important game and other wildlife specie, has become more widely understood in recent years. These high-productivity stands have been the focus of commercial timber management in the Tongass National Forest, and obtaining good examples for the RNA network in most of the major different forms they occur in the Forest becomes more difficult with time. Chaik Bay in the Admiralty Island National Monument and Wilderness is a superlative example of riparian spruce typical of the large islands of the Forest. The river entering Chaik Bay flows through a broad, low elevation floodplain that occupies most of the watershed. The riparian spruce stand at Chaik Bay is one of the most extensive areas of the type on the large islands of Southeast Alaska that has not been entered for commercial timber harvest.

The area contains exceptional brown bear habitat and productive fish habitats. Sitka black-tailed deer and bald eagle make intensive use of the low elevation forests. Beaver activity influences the riparian river bottom habitat. Marten and hairy woodpecker could be expected in the area. However, low elevation forests at Chaik Bay are not affected by the set of mammals that are common on the mainland but absent on Admiralty Island; these mammals include lynx, coyote, black bear, gray wolf, mountain goat, snowshoe hare, northern flying squirrel, and northern red-backed vole.

Other forest types include western and mountain hemlock, and low and high elevation muskegs. The Chaik Bay area includes broad and nearly level alpine benches at the north and south end of the watershed. The uncommon Tongass National Forest plants Mimulus lewisii, Veronica stelleri, and Castilleja chrymactics should be searched for in the alpine meadows of the RNA.

2 Gambier Bay

LUD 1
Admiralty Island National Monument

Gambier Bay was named for an official of the British Admiralty office during the voyages of the explorer Captain George Vancouver. The area is proposed as an RNA in order to include productive wildlife habitat and a variety of special geological features. The Gambier Bay area includes the shoreline of Snug Cove, a shallow arm of the restricted-circulation bay, and a segment of rocky shoreline along Stephens Passage. A Forest Service recreation cabin adjacent to the proposed RNA accommodates visitors. The Gambier Bay shoreline is a popular brown bear hunting area. The diverse geology, and the forests that have developed in response to the diverse geology, have been the subject of recent study, including the establishment of four intensively mapped permanent forest reference plots (0.1 to 0.25 ha, data available from Alaback and Juday), one of which has been monitored since 1979.

The shoreline of the Snug Cove portion of the area supports a very high density of nesting bald eagles. The area supports a high population of Sitka black-tailed deer and is representative of high-quality, low elevation old-growth forest habitat important for foraging and shelter from snow. Brown bear are numerous in the area. The extensive tidal flat in Snug Cove is an integral part of the ecosystem of the area and is heavily used by shorebirds such as lesser yellow legs, Bonaparte's gull, sandpipers, turnstones, and plovers and to a lesser degree by great blue heron and robin. Significant numbers of migrating ducks and geese have also been reported in the area and especially in rafts or groups on the bay surface. Cooperation with the State of Alaska may allow a state reserve on the tidelands to complement the RNA.

The peninsula that divides Snug Cove from Stephens Passage (Gain Peninsula) is made up of vertically standing dolomite and limestone bedrock layers. The limestone surface is marked by solution pits - circular depressions formed by the acid groundwater dissolution of limestone bedrock. The internally-drained and nutrient-rich limestone soils produce a superlative old-growth western hemlock forest with many very large trees. Several underground streams can be heard flowing down in the limestone rock. Although the surface has no live streamcourses, cold springs emerge at the limestone-basalt contact near the Stephens Passage shoreline.

Much of the low elevation shoreline of the area is marked by a coastal staircase bench - a series of terraces and small cliffs formed by wave erosion at different past relative sea levels. These well-drained surfaces also support old-growth forest, although landslides and boulders are occasionally dislodged from the rim of the cliffs, destroying small patches of forest.

Rocky beach on the tip of Gain Peninsula and nearby Gain Island are hauling-out grounds for sea lion. Harbor seal are common in the bay.

The area contains a diverse set of plant communities representative of Admiralty Island. Sitka spruce/Pacific reedgrass open forest is found in a thin fringe along the Stephens Passage coast. Several western hemlock-Sitka spruce forest types are present, especially the Alaska blueberry and rusty menziesia types. Shore pine/Alaska yellow-cedar and shore pine/black crowberry conifer woodland is typical of low elevation muskegs. A thin strip of large Alaska yellow-cedar trees is found along the margin of the larger muskegs and wetlands.

Well over 100 vascular plant species have been collected or noted in the area; the list of species collected, noted, or expected in the vicinity totals 430. The coastal fringe, especially along Snug Cove, is characterized by coastal elymus, Bering hairgrass, and lyngby sedge herbaceous types in decreasing elevation. The lower end of National Forest ownership (mean higher high tide) and the beginning of state tideland ownership occurs somewhere in this sequence.

Firewood gathering has affected a portion of the area, and other recreation uses will need further evaluation and coordination.

3. Tiedeman Island LUD 1
Admiralty Island National Monument

Tiedeman Island is in the center of Seymour Canal, a large inlet surrounded by Admiralty Island National Monument and Wilderness. The Tiedeman Island area is proposed in order to include exceptionally high-density bald eagle nesting habitat in an RNA and maintain the continuity of long-term eagle studies. The proposed RNA also includes the nearby Bug Islands in addition to Tiedeman Island, at the recommendation of the U. S. Fish and Wildlife Service. Muskeg and beach forest types are included in the area. The area is linked through the eagles (feeding on fish) to the marine ecosystem of Seymour Canal.

On Tiedeman Island, mature forest covers about 30 percent of Admiralty Island. Most of the remainder supports muskeg and low productivity open woodland types, only one lake and one watershed exist on the Island. Elevations on the island are below 200 meters.

A great variety of high-quality food is available to bald eagles. Fish comprise the greatest portion of the diet, although seabirds and waterfowl are seasonally important. Eagles of the area have been observed eating salmon, pollack, cod, herring, smelt, sculpins, rockfish, flounder, and halibut. Scoters, scaup, goldeneye, bufflehead, ducks, and geese are important winter food. Carrion is available in the form of seals, sea lion, deer, bear, whales, and other wildlife.

The fringe of tall mature Sitka spruce around the perimeter of Admiralty Island provides ideal nesting platforms and lookout perches. In addition to bald eagle habitat, the islands may serve as important deer winter ranges. Vancouver Canada geese nest in the area, both in the trees and on the ground.

4. Pleasant Island LUD 2
Hoonah Ranger District

The western portion of Pleasant Island is an important field site for researchers studying ecosystem development on recently deglaciated land surfaces in Glacier Bay National Park. Pleasant Island was not covered by neoglacial advances which so drastically affected Glacier Bay as recently as two centuries ago. The island is one of the closest areas with old-growth forest, lake and muskeg ecosystems to compare with the successional surfaces in Glacier Bay National Park, and has been actively used in plant succession, ecosystem processes, aquatic ecology, and soils studies.

Geologically, Pleasant Island consists of relatively young (Tertiary: Oligocene to Miocene--about 25-16 million years old) andesitic lava flows and breccias that unconformably overlie an uneven surface that cuts across much older (late Silurian: about 420-410 million years) sandstone and siltstone turbidite beds.

The latter were folded, otherwise deformed, and eroded before the flat-lying tertiary volcanic rocks were erupted. "The Knob" on the island is an undated plug of basalt; it is probably the same age or younger than the other volcanic rocks. The Silurian strata are part of a very widespread group of formations that occur throughout the Alexander Archipelago. The tertiary volcanic rocks are part of a narrow belt that extends from north of Glacier Bay proper across much of Southeastern Alaska to the Misty Fiords area on the south.

Pleasant Island includes a wide representation of upland and wetland ecosystems typifying much of the northern interior island province. Muskegs include 20 species of vascular plants and 12 species of mosses and liverworts not found at low elevations in Glacier Bay. Good examples of old-growth mixed western hemlock and Alaska cedar forests occur in the eastern portion of the island. On the western portion of the island the forest primarily occupies steeper slopes along streams. The youngest surfaces, a peripheral zone near shore are covered with Sitka spruce.

Recent and ongoing studies by Daniel Engstrom have focused on the hydrological processes that operate in the complex of old-growth forest and muskeg ecosystems on the island, and an age sequence of lakes on the island. The aquatic ecosystems on the proposed Pleasant Island RNA are being used for comparisons with a wide range of aquatic ecosystem age classes in Glacier Bay National Park. Radiocarbon dating suggests some of the bog basins on Pleasant Island may be greater than 14,000 years old. Pollen and peat accumulation in lake sediment and in bogs there provide an important long-term record of large-scale ecosystem changes of significance to the Glacier Bay area as a whole.

Pleasant Island supports significant populations of bald eagle, Sitka black-tailed deer, and Vancouver Canada goose.

Access to the area is particularly good; Gustavus airport is just a few kilometers north across Icy Passage.

5. Upper Tenakee Inlet Hot Springs

LUD 3
Sitka Ranger District

This is one of the few remaining pristine hot springs in Southeast Alaska. The hot water flow is concentrated in two main vents and several seeps that emerge through riparian gravel at the foot of a steep hill. The main pool is reported to have a water temperature of 76 degrees C, making it a medium-grade geothermal system. The flow rate of the combined springs is about 90 liters per minute, a moderate to low rate of flow. Sulfur content is distinctly higher (about 220 mg per liter) than at Bailey Bay Hot Springs. A large pool of hot water is generally clear and has several large old logs in it. A late winter visit during a heavy snow year showed that geothermally heated ground covers a large area around the hot springs vents.

No plant collections have been reported from the hot springs but the warm to hot soils and the special chemistry of the water could be expected to produce at least some major range extensions. Uncommon species of the Tongass National Forest that should be searched for include <u>Scheuchzeria palustris</u>, <u>Poa laxiflora</u>, <u>Juncus nodosus</u>, <u>Geocaulon lividum</u>, <u>Stellaria crasifolia</u>, <u>Rhododendron camtschaticum</u>, and <u>Lycopus uniflorus</u>. Lush moss communities line the edge of the pool. Tracks around the pool indicate that the hot springs is probably a

seasonal wildlife concentration area, especially for deer and songbirds. Red squirrel were observed to be numerous and active unusually early in the year.

The entire mountain south of the hot springs is included in the RNA proposal in order to encompass the groundwater infiltration and recharge zone affecting the hot springs vents. Lengths of the unnamed river above and below the hot springs discharge zone are included in order to allow studies of the stream before and after mixing with the hot water. The RNA proposal extends across lowlands, heavily used by wildlife, to the shore of Tenakee Inlet.

Recreation use of the area will require further evaluation and coordination with the RNA proposal.

6. Swan Cove

LUD 1
Admirality Island National Monument

Swan Cove is being proposed as a potential candidate RNA to replace Pack Creek RNA. This proposed RNA would represent old-growth spruce/hemlock forest types in northern Southeast Alaska, and also includes excellent examples of estuary, beach fringe, riparian, subalpine and alpine habitats. This proposed RNA includes productive brown bear, bald eagle, river otter and Sitka black-tailed deer habitats.

OTHER RECOMMENDED POTENTIAL CANDIDATE PROPOSALS

7. Tonalite Creek

LUD 3
Sitka Ranger District

This area is proposed in order to represent a pristine example of riparian spruce, productive bear and fisheries habitat, western and mountain hemlock, muskegs, and yellow-cedar vegetation types. There is a long history of fisheries, hydrology, and brown bear research, and one of the most productive salmon fisheries in Southeast. The research was undertaken to establish a baseline of information against which to measure the effects of road construction and timber harvest. Although riparian spruce forests are not any more extensive at Tonalite than they are at Chaik Bay, improved access and research opportunities from its proximity of recently logged areas, and a more productive fisheries make it a greater research opportunity in Tonalite Creek. The RNA committee was unanimous in its recommendation for the designation of Tonalite as a RNA, but due to the requirement of adhering to the Regional Guide we were unable to recommend it over the LUD 1 of Chaik Bay, since Tonalite does contain adequate examples of the principal ecosystems needed in the RNA system for this geographic province.

CENTRAL INTERIOR ISLANDS

PRIORITY POTENTIAL CANDIDATE PROPOSALS

1. Bailey Bay Hot Springs — LUD 2, Ketchikan Ranger District

In Southeast Alaska nearly all hot springs have been developed for resorts or public recreation. Modification of the springs for these purposes has resulted in the destruction of specially adapted high temperature organisms and delicate or unique rock formations. Bailey Bay Hot Springs are reported to have been tapped to some unknown degree for a resort before 1940, however, the main vents, pools, and seepage slope are reported to be in nearly pristine condition. Bailey Bay Hot Springs has the highest surface temperature of any hot spring in Southeast Alaska, and represents one of the only opportunities to include a medium to high grade (reservoir temperatures above 150 degrees C) geothermal area in an RNA anywhere in Alaska.

At least 10 major seeps and several minor seeps issue from granitic bedrock on a northwest-facing slope above Spring Creek valley; they drain into Lake Shelokum. Temperatures of the seeps range from 92 degrees C to 71 degrees C. The water at the hottest vent has a pH of 8.9 (alkali).

The freshwater wetland plant Lycopus uniflorus has been collected in the RNA, one of only two known collections in Southeast Alaska. The only collection in Alaska of Campanula scouleri was made in the area or at a nearby hot spring. The wetland grass Poa laxiflora should be searched for in the area; only two collections are known in Alaska.

Current development in the area of the Bailey Bay Hot Springs includes a CCC constructed 3-sided shelter, and a 2.2 mile trail which extends from Bailey Bay past Lake Shelokum and on to the shelter near the springs. The spring itself has not been developed except for placing rocks and plastic sheeting on occasion to create pools. Current use of the hot springs is low due to the poor condition of the trail. The use of Lake Shelokum, which is stocked with eastern brook trout is also low due to the trail condition.

In 1982, private interests proposed developing the spring into a resort. The resulting Environmental Assessment recommended no action and to maintain the status quo. The Ketchikan Area recommends this philosophy be continued with the establishment of a Bailey Bay Hot Springs RNA designed and managed to continue and enhance the recreation use of the area.

The following reports have been compiled by the FS for the Bailey Bay Hot springs area: 1) A Sensitive Plant Survey at the Bailey Bay Hot Springs Lake Shelokum, Southeastern Alaska, by Mary Clay Muller. 2) Geologic Report for Bailey Bay Shelokum Lake Hot Springs Resort Application, by Frederick W. Prange. 3) 1982 Environmental Assessment: Bailey Bay Hot Springs Management, signed 8/13/82 by Forest Supervisor Win Green.

2. Falls Creek Windthrow

LUD 3
Petersburg Ranger District

This even-aged stand of spruce and hemlock in a strip going up a hillside apparently followed a catastrophic windthrow event about 200 years ago. The stand has been used for growth and yield research, and could be a valuable resource for future work on forest-soils interactions. This stand is much more productive than most forests of its age, or with its soils (Karta series), presumably due to the effect of windthrow on disturbing the soil, and, thereby, mixing organic and mineral layers. Comparisons with nearby less disturbed soils could be used for future research. The Falls Creek windthrow is currently used as a demonstration area for illustrating maximum levels of productivity in unmanaged second-growth forests. Because high volume second-growth stands have been utilized heavily in the past, they are relatively rare, and present unique research opportunities. Falls Creek is also easily accessible since it is on the Petersburg road system. This road access also results in relatively high recreation use in the area. The RNA committee felt Falls Creek Windthrow would make a valuable addition to the RNA system, primarily by representing the cell for mature second-growth spruce-hemlock forest.

3. **Kadin Island**

LUD 3
Wrangell Ranger District

This area is proposed because of the occurrence of a unique form of high-productivity Sitka spruce/devil's club forest type. High winds moving down the Stikine River canyon pick up silt from the unvegetated glacial river floodplain and deposit it as loess on islands at the river's mouth. The continuing rain of loess onto the upper soil layers provides a supply of unleached, nutrient-rich soil material to the forests of the island. The loess deposition overcomes the process of acid bog formation (paludification) that overtakes most stable sites of moderate topographic relief in the Tongass National Forest. Few areas in the world have a combination of high rainfall and recent loess deposition, so the properties of the soils here are of special interest. Thick loess soils also have a high water-storage capacity, so the hydrology of the island is of interest, too.

The fringe of the island is subject to tidal influence and changes in water level due to shifts of the river. Wetland marsh communities should be included in the RNA if possible. Plant species uncommon to the Tongass National Forest that should be searched for include the following wetland species: Glyceria leptostachya (collected near Wrangell), Eleocharis kamtschatica, Nymphaea tetragona, Caltha biflora (observed in Stikine bottomlands near Kakwan point) and Lysimachia thyrsiflora (collected in Stikine River marshes).

Kadin Island bald eagle nest concentration is second only to parts of Admiralty Island, according to the U. S. Fish and Wildlife Service (personal communication).

Kadin Island is steep-sided and cone shaped in profile. Results are available from forest stand reconstruction studies during logging on nearby Vank and Rynda Islands. Access to the area is excellent; the city of Wrangell is only about 6 kilometers south of the area.

4. Port Camden Fossil

LUD 4
Petersburg Ranger District

Port Camden is a well-known fossil tree and plant locality. Exposures of individual plant remains and numerous logs of early Tertiary species occur in bluffs on either side of the bay. The fossils are estimated to be over 40 million years old. Fossil stumps and logs are present as both silicified and carbonaceous remains. Tuffaceous beds (volcanic ash) that contain carbonized imprints of plants are also present. The best fossil exposures are along the shore where marine erosion removes material in the bluff and concentrates remains in the intertidal zone. Recent road construction in the vicinity carved another exposure through the fossil-bearing layer. Further excavation or accelerated erosion on the uplands may damage paleontological resources.

Several warm temperate forest species have been identified among the fossils, including bald cypress (Taxodium dubium), redwood (Sequoia langsdorfii), chestnut (Castanea castaneaefolia), hazelnut (Corylus maquarii), planetree (Planera ungerii), and the fern Osmunda doroschkiana.

This area contains mining claims. These mining claims will need to be an evaluation factor in considering final recommendations for this proposed RNA.

5. South Etolin Island

Released-no LUD
Wrangell Ranger District

South Etolin Island is proposed in order to include an old-growth forest of fire origin, examples of the western hemlock/western red cedar forest type, and communities within the mixed conifer series including mountain hemlock, shore pine, and red- and yellow-cedar muskeg types. Forest fires are exceptionally rare in the Tongass National Forest because of high rainfall and the lack of natural ignition sources. The principal burned area within the proposed area regenerated from a fire that occurred an estimated 300 years ago. Fire scars occur on many trees in the area, indicating that the burning history of the forest here is probably a complex mosaic. The 300 year-old fire probably escaped from native burning of a western red cedar tree or snags. Snag or tree burning was a technique natives used to hollow out logs prior to carving them with stone tools to make sea canoes. Western red cedar was the basis for the northwest Indian culture and most stands near tidewater were heavily used for items such as woven bark, baskets, house planks, poles, paddles, weirs, and canoe logs. Western red cedar is generally restricted in Southeast Alaska to areas south of Sumner Strait.

Wolves occur on Etolin Island and they range into the area of the potential RNA. Sitka black-tailed deer populations, as judged by their effects on preferred browse species, are relatively low in the area. The area offers the opportunity to investigate possible relationships between wolves and deer. South Etolin was the site of a Roosevelt elk introduction in 1987; future elk introductions are being considered.

The area contains the western hemlock/salal, the mixed conifer/salal, and the mixed conifer/salal/skunk cabbage communities which are restricted to the southern portion of the Tongass National Forest. Upper elevations in the area support the mountain hemlock/Alaska blueberry/cassiope community. Areas of beach and beach fringe communities add habitat diversity to the area.

No systematic plant collections have been made in the area but rare species that should be searched for include Asplenium trichomanes, Glyceria leptostachya, Oxycoccus palustris, Penstemon serrulatus, and Mimulus lewisii.

OTHER RECOMMENDED POTENTIAL CANDIDATE PROPOSALS

6. Duncan Salt Chuck

LUD 1
Petersburg Ranger District

A salt chuck is a brackish lagoon usually constricted by a reversing waterfall. Fresh water from a stream or river spills over a rock shelf or obstruction during low tide stages, but during flood tide saltwater or brackish water cascades over the obstruction in the opposite direction. This unusual geological feature is found only along seacoasts with large tidal fluctuations and shorelines that are dynamic and relatively youthful so that they are not yet buried by sediments. Southeast Alaska experiences large tidal amplitudes and is dynamic because of tectonic uplift and subsidence and isostatic rebound.

Duncan Salt Chuck is one of the largest and best known salt chucks in the Tongass National Forest and is set in the Petersburg Creek-Duncan Salt Chuck Wilderness Area. The RNA proposal is designed to include shoreline and associated upland ecosystems surrounding the restricted-circulation bay or salt lagoon in which the reversing falls occurs. Cooperation with the State of Alaska will allow the inclusion of key features below mean higher high tide in a state tidelands reserve.

Extensive muskeg and wetland communities line the level uplifted marine terrace that makes up much of the shoreline of the area. These communities are highly productive for waterfowl and shorebirds. In addition, the proposed RNA is an important spring black bear feeding area, contains many bald eagle nests, and is important fish-rearing habitat. The area also contains two public recreation cabins and receives "heavy" recreation use. Little detailed inventory information is available on the plants of the area. Uncommon plant species of the Tongass National Forest that should be searched for in the area include Scheuchzeria palustris, Eleocharis kamtschatica, Calypso bulbosa, and Nymphaea tetragona.

7. West Duncan Uplift

LUD 3 (& 4)
Petersburg Ranger District

West Duncan Uplift contains special landforms that illustrate the development of a post-glacial landscape of the major islands of the Tongass National Forest. During the time of deglaciation at the end of the Wisconsinian glacial period (12,000 to 14,000 years ago) because of the depression of the land surface by the weight of glacial ice, what is now Kuprenof Island was a series of rocky islands. As the Wisconsinian glaciers melted, vast quantities of glacial sediment were deposited among the rocky islands now comprising the mountain peaks of Kuprenof Island. Once the weight of glacial ice was removed the compressed earth crust expanded and the land surface rose by a process known as isostatic rebound. The area is made up entirely of level uplifted marine deposits.

The glacio-marine deposits within the area are predominantly silt with sand lenses and clays. Fossils of modern marine shellfish such as cockels and pearly mussels are present. The terrace has been above sea level for about 7,000 or 8,000 years. During that time a stream system incised its meandering path down

through the sediment. In the incised stream system there are several features of river morphology including paired terraces, meander sears, and abandoned channels. The streams have little further erosive power because the downcutting channels have reached bedrock obstructions.

The level, low-elevation plains of the area are one of the most extensive wetlands and muskeg surfaces in the Tongass National Forest. Tidal mudflats are important for migrating shorebirds. There is one recreation cabin, and Indian Point is an inventoried site of high potential for developed recreation; present recreation users include waterfowl hunters. The area contains mining claims which will need evaluation in identifying final recommendations and final boundaries. Little information about vegetation types and plant species is available for the area.

8. McDonald Lake LUD 2
Ketchikan Ranger District

This area would target study of riparian spruee and other upland forested and non-forested habitats. The MeDonald Lake area eontains sites from near sea level to 3,500 feet (alpine). A full range of volume class stands (hemlock, spruce, and hemloek/spruee) are present. Hydrologic features are diverse.

All five species of salmon are present, plus steelhead, and dolly varden. McDonald Lake has historieally supported one of the largest sockeye runs in Southeast Alaska. Recent fisheries enhancement to restore that run has been accomplished by fertilization of the lake (a seven-year projeet scheduled to end in 1989). Additional fish enhancements are being considered for the inlet. Beeause of the enhancement work, the area is not suitable as an RNA for fish, and the proposed boundary exeludes the lake and other areas which have been altered.

An abandoned fish hatchery is located at the Walker Creek inlet to the lake. Second-growth timber stands (about 40 years old) which occurred after logging are near the fish hatchery. Yes Bay, at the outlet of the lake, has a resort and heavy recreation use; the upper end of the lake and the riparian stands, in particular, are off the beaten path. Little conflict with recreation use is anticipated. The boundary proposed for the McDonald Lake RNA excludes the abandoned fish hatchery, second growth, and heavy recreation areas.

Mountain goat, brown bear and wolves are inhabit the area.

SOUTHERN OUTER ISLANDS GEOGRAPHIC PROVINCE

PRIORITY POTENTIAL CANDIDATE PROPOSALS

1. Disappearance Creek LUD 4
Craig Ranger District

Disappearance Creek watershed is a steep north-south drainage. One entire side of the drainage is a landslide which buried the stream, and this side of the drainage currently has no trees.

The lowermost segment of the valley is reported to contain an above ground spring-fed stream course with high fisheries productivity.

2. Johnson Lake

LUD 3
Craig Ranger District

Johnson Lake RNA contains a good, but small, riparian spruce stand, high fisheries values, at least two plants uncommon to the southerly portion of the Tongass National Forest, and good examples of typical southern Southeast Alaska forest types. Floodplain Sitka spruce in the RNA are very large, reaching diameters of 280 cm (110 inches); most dominant trees are 64 to 67 meters (210 to 220 feet) tall, making the stand where the trees are located one of the most superlative remaining spruce stands in Southeast Alaska.

Physocarpus capitatus is reported along freshwater stream margins in the area. _Spiraea douglasii_ is reported along the lake shore. As the southernmost of the new RNA proposals for the Tongass National Forest, Johnson Lake RNA has the potential to contain several range-limited plants and animals. Some of the most significant potential plants are _Asplenium trichomanes_, _Poa laxiflora_, _Juncus nodosus_, _Platanthera gracilis_, _Viola sempervirens_, _Monotropa uniflora_, and _Stachys emersonii_.

This area is critical to the overall transportation system coordinated with the State in their Prince of Wales Area Plan, to serve several bays in the Moria Sound to Ingraham Cove area. The transportation system and log transfer facility would serve 215 million board feet, of which about 40 million board feet is in the proposed RNA.

3. Mount Calder-Virginia Mtn.

LUD 4
Thorne Bay Ranger District

Mount Calder-Virginia Mountain contains the only known coastal population of subalpine fir, several uncommon plant species that suggest its role as a glacial refugium, and typical southern Tongass National Forest forest communities on Prince of Wales Island. The area has a history of alpine research and will be of continuing value for additional comparative studies.

Several plants noted in the area are reported in Southeast Alaska for the first time. These species are _Androsace chamaejasme_, _Arctostaphylos alpina_, _Arnica diversifolia_, _Draba lactea_, _Draba lonchocarpa_, _Senecio lugens_, and _Woodsia glabella_. A plant identified as _Antennaria umbrinella_ is reported from the area, which would be an addition to the flora of the state. However, it is known to intergrade with _A. rosea_ (common in northern Alaska but only one collection in Southeast Alaska). Several plants reported on Mount Calder-Virginia Mountain are significant southward range extensions over previously known distributions in Alaska. These species include _Anemone parviflora_, _Cerastium beeringianum_, _Dryas drummondii_, _Erigeron humilis_, _Oxytropis campestris_, _Poa alpina_, _Poa arctica_, _Salix reticulata_, _Saxifraga oppositifolia_, _Silene acaulis_, _Thalictrum alpinum_, and _Tofieldia coccinea_. Most of these species are characteristic of arctic and subarctic alpine sites in interior Alaska and the high elevations of northernmost Southeast Alaska. Collectively they suggest the area may have been a glacial refugium with remnants of an ice age flora characteristic of a climate colder than that of contemporary Prince of Wales Island. Additional taxonomic work on the flora of the area is needed, with specimens deposited in Alaska herbaria.

The subalpine fir community is made up of relatively small trees in a stand that extends to treeline and includes several wind-trained, prostrate or krumholz-form trees. The stand is located on the summit and northeast-facing slopes of the

Virginia Mountain ridge system down to an elevation of about 300 meters (1000 ft). The summit of Virginia Mountain and the north-facing slope of Mount Calder contain well-formed cirque basins. The south-facing slope of Mount Calder rises directly up from tidewater and contains enough rough broken ground on the summit that it may have been a nunatak during much of the Wisconsinian glacial period.

Important forest types in the area are mountain hemlock, Alaska yellow-cedar, and western hemlock series. Limestone bedrock underlies some of the area, and karst features should be looked for in the area.

The Mount Calder-Virginia Mountain area is an important part of the Primary Sale Area for the KPC long-term timber sale and has been partially roaded and logged. It contains several approved units for the 1989-1994 operating period. The area is also included in one of the moratorium areas for HR 987. Depending on legislation and timber sale activity, the boundary of the proposed RNA can be adjusted. The primary emphasis in proposing this area as a research natural area is to capture the only known coastal population of subalpine fir.

4. Sarkar Lakes

LUD 2
Thorne Bay Ranger District

Sarkar Lakes is proposed because its watershed system supports a significant run of sockeye salmon. Sockeye runs are known from only about 60 of the 3,000 streams in Southeast Alaska that support anadromous fisheries. The availability of lake habitat for a juvenile rearing stage is an important factor in high-productivity sockeye fisheries. The sockeye run at Sarkar Lakes is important for commercial and sport harvest and is monitored at a weir by the Alaska Department of Fish and Game for the US-Canada salmon treaty. The Sarkar Lakes system has high population of coho salmon, cutthroat, and dolly varden. Pink salmon also occur here.

The watershed of Sarkar Lakes is on limestone bedrock that contributes to the high productivity of the aquatic ecosystem, especially high densities of juvenile salmon. Unlike the many valley moraine lakes in the mountains of Southeast Alaska, these lakes are representative of low-elevation gently rolling glaciated terrain. Warmer water temperatures in this low elevation watershed may also contribute to high aquatic productivity. Studies at Sarkar Lakes have shown that juvenile sockeye grow faster, get bigger, and go to sea earlier than in many other lakes and streams where they occur in Southeast Alaska.

This area is an overwintering area for the trumpeter swan, and has even-aged stands.

The Sarkar area has a heavy sockeye salmon subsistence use, and heavy and growing recreation use. Coordination will be needed to accommodate these uses and maintain the qualities of the area as an RNA.

5. Thunder Mountain

LUD 4
Craig Ranger District

Thunder Mountain area is proposed to include a possible glacial refugium, alpine plants uncommon in the Tongass National Forest, outer coastal forest types of the southern Tongass National Forest, potential habitat for the marbled murrelet, a karst landform, even-aged 150-200 year old productive stands on limestone, a sockeye stream and lake, very diverse wildlife, and possibly subalpine fir.

Three plant species collected at about the 950 m (3110 ft) elevation on Thunder Mountain represent significant range extensions, Salix reticulata, Thalictrum alpinum, and Tofieldia pulsilla. The subalpine meadow plant community types found on Thunder Mountain are markedly different than the common types of southern Southeast Alaska. The soil parent material over much of the area is marble, which is often associated with noteworthy plant communities, rare or uncommon plant occurrences, and high-productivity forest types.

Thunder Mountain rises directly from the outer coast of the open North Pacific, and has no high elevation snow-gathering areas behind it toward the mainland. The topography of the mountain is very steep, rough, and broken, not rounded and polished as much of mountainous Southeast Alaska is. The location and physiography of the area suggest that it may have been an ice-free nunatak during at least portions of the Wisconsinian glacial period.

Thunder Mountain appears to contain suitable nesting habitat for the marbled murrelet. The marbled murrelet is a seabird which feeds on the open ocean and nests in old-growth forest trees. The Threatened, Endangered and Sensitive Species section of the AMS contains more information on the marbled murrelet.

Manhatten Lake is included within the proposed area. This lake system which has contains a natural run of sockeye salmon and has been untouched by habitat manipulation or enhancement. Maintaining the lake and streams in a natural state to provide baseline information for comparison with the numerous other lakes and streams which have been manipulated or enhanced is a very high priority.

This potential RNA is bordered by Native Corporation land on the south and east. The State proposes selection of community sites across Hook Arm from the proposed RNA. Rough seas could present access problems, access across Native lands through a cooperative agreement may present a possibility.

The Thunder Mountain RNA, located on the outer coast of Dall Island, is subject to rapid changes in weather as storms from the open North Pacific Ocean quickly develop and move onshore.

OTHER RECOMMENDED POTENTIAL CANDIDATE PROPOSALS

6. **Hunter Bay - Biscuit Lagoon** LUD 1
Craig Ranger District

This area contains a freshwater lake and brackish lagoon environments, similar to Salmon Bay. Western hemlock, Sitka spruce, mixed hemlock/spruce, and western red cedar forest types are present in the proposed RNA.

This proposal contains habitats for a variety of wildlife species, including: bald eagles, Sitka black-tailed deer, marten, gray wolf, black bear, numerous waterfowl species, river otter, spruce grouse, Prince of Wales flying squirrel, and Prince of Wales ermine. There is a good possibility that trumpeter swans may over winter in this area, but this has not been documented.

Sockeye, pink and chum salmon are present in the area. According to the Natives in the area there is good fishing.

Even-aged second growth conifer stands occur in the area as the result of blowdown and landslides.

7. Klakas Lake

LUD 1
Craig Ranger District

The Klakas Lake area is proposed for RNA status to assure a quality riparian spruce study area in each of the three provinces on the Ketchikan Area. The area would encompass the entire lake, its inlet and outlet, and a small estuary located at its outlet. Sockeye salmon are present in the lake; pink and chum salmon are present in its outlet. The inlet contains a wide active flood channel with riparian spruce. Photo interpretation indicates this area would provide a better riparian spruce forest feature than that available at Johnson Lake. Low to high volume hemlock stands are present; cedar may be present in some stands.

8. South Sumez-Angel Falls

LUD 4
Craig Ranger District

More information is needed before this area can be proposed as an RNA. There is a possible rare lily present near Angel Falls; field searches by qualified botanists would be required to verify its presence. Recent volcanics provides a possible unique geologic feature. There may be opportunity to encompass a full range of forest types from riparian spruce to productive upland forest to muskeg.

EXISTING DIRECTION
Regional Guide

In accordance with current planning direction, a system of research natural areas/ecological reserves is to be established, based upon the need to protect and preserve for study special ecological- and geological-type sites that are representative of the natural diversity of Alaska's National Forests. The establishment of these sites is a part of a larger cooperative effort by several resource management agencies in Alaska to establish both undisturbed study sites (Research Natural Areas) as well as sites reserved for use in studies that may modify the environment. While sites of both types are included in ecological reserves, Research Natural Areas are of primary concern in Forest planning. The establishment of Research Natural Areas, therefore, will be based upon discrete plant communities, geological features of scientific interest, and a limited set of animal species occurrences.

Future Research Natural Areas will be selected through the use of the following steps in the Forest planning process.

1. Compare features on existing Research Natural Areas with lists of types needed to determine those needs that are already fulfilled. In some cases, this will require better information on the natural features of the existing Research Natural Areas than is available currently. A guidebook that documents existing Research Natural Areas and other ecological reserves in Alaska is being prepared and will assist in this effort. Coordination and cooperation with designated research representatives is required.

2. Identify priorities among the remaining unmet type needs. Several criteria can be used to establish these priorities. If the potential effect of management on a particular type need feature is of concern, then a high priority could be established for that feature. It should be remembered that the goal is to adequately represent the feature in order to be able to conduct research and educational activities, not to preserve large amounts of land. Other criteria for setting priorities would include scientific interest, need for baseline information, and opportunity for efficiencies in travel and logistics in field work at a site.
3. Combine remaining unmet type needs into estimated area needs. Each type need will not require a separate research natural area. Well-chosen candidate Research Natural Areas will contain several type needs. Maximizing the number of natural features within a given area adds interest because diversity is itself a condition of scientific interest.
4. Initiate the search for these area needs on the Forest Service National Monuments; these National Monuments were established partly for scientific and educational purposes. When appropriate, Research Natural Areas should be sited on these monuments, since the monuments represent the most compatible land-use allocation within Alaska National Forests for this purpose. Research Natural Areas proposed for the monuments will be carefully selected in accordance with planned type needs and research needs in consonance with the monument's scientific purposes.
5. If the feature or area need is unavailable in a monument, then enlarge the search to wilderness areas, wilderness study areas, or other withdrawn lands. If a research natural area is to be established in any of these designated or withdrawn areas, then it should be reasonably accessible, which generally means no more than a 2-hour hike from the nearest permitted point of vehicle (boat or aircraft, in particular) access.
6. If the feature or area need cannot be met in a monument, wilderness, wilderness study area, or other withdrawn area, then broaden the search to National Forest land-use designations that involve no programmed resource management (LUD 2 or equivalent).
7. If the type need remains a priority and cannot be met in any of the preceding land-use designations, then broaden the search to National Forest areas of programmed resource management (LUD 3's and 4's in the Tongass Land Management Plan). Attempt to accommodate the need to the greatest extent possible in portions of management units that are not available for resource development and extraction.
8. After selection of Candidate Areas, National Forest and Research personnel will proceed with establishment review procedures leading to the designation of Research Natural Areas as part of the Forest Planning process.

RESULTS OF TLMP IMPLEMENTATION

Red River RNA was established in 1980. Work has progressed on the establishment report for Gambier Bay RNA. Other than that, no RNA's have been established or progressed along the establishment process since TLMP implementation.

Research has been conducted in the existing RNA's including such subjects as landscape ecological studies, plant succession, characteristics and dynamics of old-growth forests, decline of Alaska yellow cedar, brown bear behavior and brown bear-human interactions, and hydrologic monitoring. Permanent research plots

have been established in Cape Fanshaw, Limestone Inlet, Pack Creek, and Red River.

OPPORTUNITIES AND CONCERNS

1. Currently there are no management standards and guidelines for any of the existing RNA's. Inappropriate activities have been allowed to occur in the existing RNA's as a result of no management direction. There is an opportunity to develop management standards and guidelines to help protect the purposes for which RNA's are established.

2. Mineral withdrawals need to be completed for some of the existing RNA's.

3. For the non-forest types, cell types from the Regional Guide are still valid, but lack of on-the-ground resource information precluded their use for all but a few RNA proposals.

4. Important vegetation, aquatic and wildlife cells are not represented in the existing RNA's. There is an opportunity to recommend additional RNA's to fill these cell needs. This will provide needed areas for "baseline" ecological research and monitoring. RNA's are assuming greater importance in providing baseline data to monitor the effects of forest management.

5. There is an opportunity to encourage long-term research with cooperating agencies. Research could also be international in its scope, including such subjects as global warming.

5. RNA's are assuming greater importance in maintaining biological diversity. Establishment of additional RNA's containing important vegetation, aquatic and wildlife cells would help meet biological diversity goals for the Forest and Region.

ROADLESS AREAS

OVERVIEW

In accordance with the National Forest Management Act (NFMA), the Forest Plan Revision must consider the future allocation and use of remaining roadless areas. The Alaska National Interest Lands Conservation Act (ANILCA) released lands not designated as Wilderness for other uses, and stated that no additional consideration would be given to roadless areas prior to the revision of the initial forest plans. Since these areas were considered in the original Forest Plan and allocated to a variety of management practices through Land Use Designations, the inventory completed as a part of the Revision process does not alter, suspend or defer planned or ongoing Forest management activities.

Areas currently in an unroaded condition have been inventoried for the Tongass National Forest. Roadless lands are inventoried to identify areas within the Forest which meet minimum criteria for consideration as Wilderness; these criteria relate to size, area manageability, presence of wilderness attributes, and presence and extent of human-caused change or uses.

Roadless areas are defined as areas or islands of "undeveloped Federal land within which there are no improved roads maintained for travel by motorized vehicles intended for highway use, and which do not have extensive timber harvests, or other developments." A roadless island is further defined as "an area that is surrounded by permanent waters or that is markedly distinguished from surrounding lands by topographical or ecological factors such as precipices, canyons, thickets or swamps." (RARE II Inventory Criteria, USDA Forest Service). "Unroaded", as used in the inventory for the Tongass National Forest Plan Revision, means all lands and islands that do not have roads of any kind and show no significant evidence of having been harvested within the past 50 years.

The roadless inventory serves to make known the extent of the roadless resource, and provides data for use by managers, legislators and others to formulate land management proposals. Roadless areas may retain their roadless character by being managed for emphases which require relatively large, undeveloped or natural areas, such as required for old-growth habitat or for primitive recreation. Roadless areas identified in the inventory process which are outside of existing designated Wilderness may be considered for Wilderness designation or may be managed for a wide range of other resource management activities.

SUPPLY/INVENTORY

EXISTING

The Tongass National Forest is unique in the National Forest System because of its large size (nearly 17 million acres) and the fact that only small areas where communities are developing, and road construction and timber harvest have occurred, are "developed" to any noticeable degree. At various times in the past, "boom and bust" development (associated with fox farming, salmon canneries, mining, and military activity) resulted in the temporary development and occupation of many small areas that have since been largely reclaimed by nature. Presently occupied and developed areas collectively total only 1.2 million acres, or seven percent of the Tongass. Southeast Alaska residents, who number only 60,000, are virtually surrounded by land they consider "wilderness". Routine travel and ordinary outdoor recreation activities may require a higher degree of skill, risk taking and self-reliance than are typically required of adventurous backcountry visitors on other National Forests. This wildness and the lifestyles associated with it are highly prized by residents and visitors alike.

For most of its early history the Wilderness Movement focused attention on areas where resource conflicts were more apparent, and roadless lands were less

abundant. By 1980, however, more attention had been focused on the opportunity to provide legal protection to the large land areas with superlative wilderness values represented by the roadless lands in Alaska. ANILCA designated 5.4 million acres to 10 separate Wildernesses on the Tongass National Forest (see Wilderness Section). ANILCA also "released" non-designated lands to other aspects of multiple use management. The second Roadless Area Review and Evaluation (RARE II), completed in 1979 concurrent with the Tongass Land Management Plan (TLMP), identified approximately 13 million acres as roadless, and rated the Wilderness Attributes for 743 individual Value Comparison Units (VCU's), the smallest land unit used for analysis in developing the Forest Plan. In TLMP, 5,453,000 acres were identified as designated Wilderness and 171,000 acres as non-Wilderness National Monument (LUD 1). Some 285,000 acres were released from Wilderness consideration in ANILCA and allocated as LUD 1 areas in the Forest Plan for consideration for other uses through the land planning process. About 2,656,000 acres were allocated to LUD 2, in which management excluded timber sales and road construction. The remaining 6,854,000 acres of the Tongass were allocated to LUD 3 and LUD 4, both of which allowed varying degrees of resource use and development.

CURRENT SITUATION

Since 1979, about 67,000 acres of lands allocated to LUD's 3 and 4 that allowed development activities over the next 50 years have actually been altered by timber harvest, road construction, or other actions. In some cases, planned timber sales have not been cut due to economic conditions and appeals. Currently, 10,442,893 acres (Query 99) or 90 percent of nonwilderness National Forest lands are in a roadless condition. Numerous minor areas, formerly occupied by fox farms or canneries, or harvested from beaches or by A-frame logging in small bays, have continued to be reclaimed by natural processes and are now included in the roadless category.

Since the Tongass differs from other National Forests in that most of the Forest is roadless with small, often isolated areas of development, conducting an inventory presented some unique problems. Several contiguous roadless areas are so large that describing them in a single report would require a reduction in the level of detail typical of similar reports elsewhere. In order to give appropriate consideration to large areas such as these, the areas were subdivided along major geographic breaks or divided where major public issues related to local communities indicated a need to discuss portions of the area separately. For example, the roadless area along the Coast Range spanning some 150 miles from Skagway to the Tracy Arm-Fords Terror Wilderness was divided into three geographically distinct sub-units for purposes of description. In many cases, islands or groups of small islands were included with adjacent roadless areas. Some areas bisected by saltwater channels were considered by local publics as complete "areas" which they use and identify with; in other cases saltwater channels clearly separate "adjacent" roadless areas and were thus used as the boundaries of roadless areas.

The resulting 106 roadless areas are described in Appendix C. The fact that some groups of these areas make up larger contiguous areas is recognized. Table 3-110 lists each roadless area by number, name and acreage; and, where appropriate, subtotals of acres for the large contiguous land areas are shown. The reports in Appendix C contain discussions of each area's attributes and resource potentials, and an evaluation of the area's capability and availability for management as Wilderness or allocation to other roadless management prescriptions.

TABLE 3-110
ROADLESS ANALYSIS AREAS

CHATHAM AREA
(32 Areas)

COAST RANGE CONTIGUOUS AREAS

Number	Roadless Area Name	Acres	Adjacent Roadless
301	Skagway-Juneau Icefields	1,209,199	302, 305
302	Taku-Snettisham	736,112	301, 305
305	Juneau Urban	104,970	301, 302
308	Windham-Port Houghton	240,296	Tracy Arm, 302
	Subtotal Roadless NF	2,290,577	
***	Tracy Arm-Fords Terror Wilderness	650,103	
	Total Contiguous Roadless Area NF	2,940,680	

YAKUTAT CONTIGUOUS AREA

Number	Roadless Area Name	Acres	Adjacent Roadless
338	Brabazon Addition	500,374	Russell, GBNP, WSENP, 339
339	Yakutat Forelands	305,871	Russell, GBNP, 338
341	Upper Situk	61,722	Russell Fiord
	Subtotal Roadless NF	867,967	
***	Russell Fiord Wilderness	349,134	Wrangell-St. Elias NP W.
	Total Contiguous Roadless Area NF	1,217,101*	

*Area is adjacent to Glacier Bay Wilderness (2,770,000) acres and Wrangell-St. Elias Wilderness (8,700,000 acres) administered by National Park Service.

CHILKAT RANGE CONTIGUOUS AREA

Number	Roadless Area Name	Acres	Adjacent Roadless
303	Sullivan	66,657	Endicott, GBNP, 304
304	Chilkat-West Lynn Canal	207,277	Endicott, GBNP, 303
	Subtotal Roadless NF	273,934	
***	Endicott River Wilderness	98,070	
	Total Contiguous Roadless Area-NF	372,004*	

*Area is adjacent to Glacier Bay Wilderness (2,770,000 acres), administered by National Park Service

TABLE 3-110 (continued)

ADMIRALTY ISLAND CONTIGUOUS AREA

307	Greens Creek-Young Bay	48,078	Admiralty Island
	Subtotal Roadless NF	48,078	
***	Admiralty Island NM Wilderness	964,282	
	Total Contiguous Roadless Area-NF	1,012,360	

CHICHAGOF ISLAND CONTIGUOUS AREA

311	Chichagof	637,238	W. Chichagof, 328
328	Hoonah Sound	97,257	W. Chichagof, 311
	Subtotal Roadless NF	734,495	
***	West Chichagof-Yakobi Wilderness	207,772	
	Total Contiguous Roadless Area-NF	942,267	

BARANOF ISLAND CONTIGUOUS AREA

330	North Baranof	341,417	S.Baranof, 331
331	Sitka Urban	120,536	S.Baranof, 330,333
333	Redoubt	75,732	S.Baranof, 331
334	Pt. Alexander	126,120	S.Baranof
	Subtotal Roadless NF	663,805	
***	South Baranof Wilderness	315,736	
	Total Contiguous Roadless Area-NF	979,541	

OTHER AREAS

306	Mansfield Penninsula	52,994
309	Juneau Islands	7,051
310	Douglas Island	27,390
312	Trap Bay	22,008
314	Pt. Craven	11,837
317	Pt. Augusta	19,479
318	Whitestone	6,100
319	Pavlof-East Point	10,900
321	Tenakee Ridge	24,262
323	Game Creek	67,046
324	Pleasant Island	12,239
325	Freshwater Bay	63,206
326	North Kruzof	31,170

TABLE 3-110 (continued)

327	Middle Kruzof	15,540	
329	South Kruzof	56,701	
332	Sitka Sound	19,475	
Chatham Area Roadless, Non-Wilderness		5,326,254	
Chatham Area Roadless and Wilderness		8,013,686	

KETCHIKAN AREA
(32 Areas)

Number	Roadless Area Name	Acres	Adjacent Area
	SOUTH PRINCE OF WALES ISLAND CONTIGUOUS AREA		
507	Eudora	233,933	S.POW, 519
519	Polk	149,205	S.POW, 507
	Subtotal Roadless NF	383,138	
***	S. Prince of Wales Wilderness	279,242	
	Total Contiguous Roadless Area-NF	662,380	
	CLEVELAND-REVILLA ISLAND CONTIGUOUS AREA		
528	Cleveland	193,473	529
529	North Cleveland	114,158	Misty Fiords, 528
530	Hyder	128,585	Misty Fiords
577	Quartz	149,107	Misty Fiords
523	South Revilla	71,358	Misty Fiords, 524
524	Revilla	138,393	Misty Fiords, 523,524
526	North Revilla	163,771	Misty Fiords, 524
	Subtotal Roadless NF	958,845	
***	Misty Fiords NM Wilderness	1,937,855	
	Total Contiguous Roadless Area-NF	2,896,700	
	OTHER AREAS		
501	Dall Island	108,260	
502	Sumez Island	36,327	
503	Outer Islands	102,881	
504	Sukkwan Island	46,145	
505	Soda Bay	76,596	
508	Christoval	7,750	

TABLE 3-110 (continued)

509	Koglish	76,175
510	Karta	121,440
511	Thorne River	112,460
512	Ratz	8,349
513	Sweetwater	11,104
514	Sarkar	73,565
515	Kosciusko	70,216
516	Calder	12,687
517	El Capitan	43,604
518	Salmon Bay	36,366
520	Kasaan	8,536
521	Duke	46,785
522	Gravina Island	38,952
525	Behm Islands	2,042
527	Neets	6,315
531	Nutkwa	59,318
532	Fake Pass	798
Ketchikan Area Roadless Non-Wilderness		2,448,651
Ketchikan Area Roadless and Wilderness		5,199,462

STIKINE AREA
(44 Roadless Areas)

Number	Roadless Area Name	Acres	Adjacent Area
	COAST RANGE CONTIGUOUS AREA		
201	Fanshaw	48,869	Tracy Arm, 202, 308
202	Spires	536,653	Tracy Arm,Stikine, 201,308
204	Madan	68,998	Stikine, 205
205	Aaron	78,884	Stikine, 204, 205, 206
206	Cone	128,574	Stikine, 205, 207, 208
207	Harding	177,598	MF,205, 206, 208, 209, 529
208	Bradfield	212,872	MF, 205, 206, 207, 209
209	Anan	37,933	207, 210, 529
210	Frosty	41,395	209, 528, 529
	Subtotal Roadless NF	1,331,776	
***	Stikine-LeConte Wilderness	448,703	
	Total Contiguous Roadless Area-NF	1,780,479	
	KUPREANOF-ROCKY PASS-CAMDEN CONTIGUOUS AREA		
211	North Kupreanof	116,666	PDSCW , 214
213	Five Mile	19,438	PDSCW
214	South Kupreanof	209,957	PDSCW, 211, 215, 243

TABLE 3-110 (continued)

215	Castle	49,360	214
216	Lindenberg	22,797	PDSCW
242	Camden	54,730	243
243	Rocky Pass	78,976	214
	Subtotal Roadless NF	551,924	
***	Petersburg-Duncan Salt Chuck W.	47,815	
	Total Contiguous Roadless Area-NF	599,739	

SOUTH KUIU ISLAND CONTIGUOUS AREA

244	Pillars	28,570	Tebenkof, 240, 245
245	East Kuiu	46,271	Tebenkof, 244, 246
246	South Kuiu	124,065	Tebenkof, 245
	Subtotal Roadless NF	198,906	
***	Tebenkof Bay Wilderness	67,560	
	Total Contiguous Roadless Area-NF	266,466	

ETOLIN ISLAND CONTIGUOUS AREA

233	Mosman	57,974	234
234	South Etolin	113,031	233
	Total Contiguous Roadless Area-NF	171,005	

OTHER AREAS

203	Thomas	4,517
212	Missionary	14,005
217	Green Rocks	10,380
218	Woewodski	10,376
219	North Mitkof	5,876
220	East Mitkof	10,250
223	Manzanita	7,850
224	Crystal	19,293
225	Kadin	1,623
226	Greys	361
227	North Wrangell	11,624
229	South Wrangell	71,173
231	Woronkofski	9,773
232	North Etolin	46,887

TABLE 3-110 (continued)

235	West Zarembo	6,945	
236	East Zarembo	8,990	
237	South Zarembo	32,288	
238	Kashavarof Islands	16,487	? (comb w/228)
239	Keku	12,126	
240	Security	41,105	
241	North Kuiu	9,741	
***	miscellaneous rocks/islands	400	
Stikine Area Roadless Non-Wilderness		2,614,755	
Stikine Area Roadless and Wilderness		3,689,563	
Tongass NF Roadless Non-Wilderness		10,409,252	
Tongass NF Wilderness		5,435,598	
Tongass NF Roadless and Wilderness		15,844,450	

POTENTIAL

There are several characteristics of roadless areas on the Tongass which represent potentials unavailable elsewhere in the National Forest System. First, the Tongass has extremely large undeveloped land areas that could potentially be managed as Wilderness or in an unroaded condition. Several portions of the Forest constitute contiguous roadless areas that exceed one million acres, and thus represent large, unfragmented wildlife habitats and outstanding opportunities for solitude.

Many of the Tongass roadless areas represent wildlife habitats, ecosystems, and visual character that exist nowhere else in the National Forest System, such as coastal islands facing the open Pacific, extensive beaches on inland saltwater, old-growth temperate rain forest, ice fields, and glaciers. Some of these features are represented in the existing 5.4 million acres designated as Wilderness, some are not. Many of these areas are remote, difficult to access for primitive recreation, and many contain other important resource values such as timber, minerals, and salmon producing streams. Of 3,065,796 acres of suitable timberland on the Tongass outside Wilderness, 2,419,289 acres, or 78 percent, is within roadless areas. For comparison, existing Wilderness on the Tongass contains approximately 1,134,000 acres of suitable/operable timber.

Table 3-111 displays the tentatively suitable timber acres and percent by roadless area.

TABLE 3-111
TENTATIVELY SUITABLE TIMBERLAND BY ROADLESS AREA

Unit	No.	Area Name	National Forest Acres	Non-Nat. Forest Acres	Tent. Suitable Acres	Tent. Suitable %
TSA	201	FANSHAW	48,869	20	20,831	42.6
TSA	202	SPIRES	536,653	723	33,551	6.3
TSA	203	THOMAS	4,517	180	1,099	24.3
TSA	204	MADAN	68,998	3,960	22,366	32.4
TSA	205	AARON	78,884	0	7,219	9.2
TSA	206	CONE	128,574	0	4,229	3.3
TSA	207	HARDING	177,598	0	23,188	12.9
TSA	208	BRADFIELD	212,872	0	10,779	5.1
TSA	209	ANAN	37,933	0	8,063	21.1
TSA	210	FROSTY	41,395	0	11,411	27.6
TSA	211	NORTH KUPREANOF	116,666	21,957	19,928	17.1
TSA	212	MISSIONARY	14,005	0	3,683	26.3
TSA	213	FIVE MILE	19,438	859	5,259	27.1
TSA	214	SOUTH KUPREANOF	209,957	0	45,602	21.7
TSA	215	CASTLE	49,360	0	10,972	22.2
TSA	216	LINDENBERG	22,797	5,540	7,920	34.7
TSA	217	GREEN ROCKS	10,380	2,059	3,360	34.9
TSA	218	WOEWODSKI	10,376	20	5,379	51.8
TSA	219	NORTH MITKOF	5,876	3,837	1,879	31.9
TSA	220	EAST MITKOF	10,250	100	3,083	33.3
TSA	223	MANZANITA	7,850	220	2,684	34.2
TSA	224	CRYSTAL	19,293	2,501	5,764	29.8
TSA	225	KADIN	1,623	0	1,122	69.1
TSA	226	GREYS	361	0	301	83.3
TSA	227	NORTH WRANGELL	11,624	2,840	4,522	38.9
TSA	228	SALAMANDER (SEE 227)	-	0	0	-
TSA	229	SOUTH WRANGELL	71,173	4,817	22,697	31.8
TSA	230	DEER	9,134	0	4,777	52.3
TSA	231	WORONKOFSKI	9,773	0	3,545	36.3
TCA	301	JUNEAU SKAGWAY ICE	1,209,199	60	32,571	0.0
TCA	302	TAKU-SNETTISHAM	736,112	159	71,884	9.7
TCA	303	SULLIVAN	66,657	20	11,547	16.4
TCA	304	CHILKAT-W. LYNN	207,277	4,240	46,896	21.8
TCA	305	JUNEAU URBAN	104,970	699	32,133	30.6
TCA	306	MANSFIELD PENINSULA	52,994	60	23,324	44.0
TCA	307	GREENS CR.-YOUNG BAY	48,078	839	15,472	32.0
TCA	308	WINDHAM-PORT HOUGHT	240,296	481	113,789	47.3
TCA	309	JUNEAU ISLANDS	7,051	139	3,787	53.7
TCA	310	DOUGLAS ISLAND	27,390	40	9,696	35.2
TCA	311	CHICHAGOF	637,238	32,201	150,060	23.6
TCA	312	TRAP BAY	22,008	20	10,074	45.4
TCA	314	POINT CRAVEN	11,837	40	4,095	33.3
TCA	317	POINT AUGUSTA	19,479	0	11,259	57.7
TCA	318	WHITESTONE	6,100	40	2,380	37.7
TCA	319	PAVLOF-EAST POINT	10,900	0	7,100	65.1

TABLE 3-111 (Continued)

Unit	No.	Area Name	National Forest Acres	Non-Nat. Forest Acres	Tent. Suitable Acres	Tent. Suitable %
TCA	321	TENAKEE RIDGE	24,262	6,143	5,801	23.9
TCA	323	GAME CREEK	67,046	21,566	21,835	32.5
TCA	324	PLEASANT ISLAND	12,239	0	3,020	25.0
TCA	325	FRESHWATER BAY	63,206	8,823	23,961	37.8
TCA	326	NORTH KRUZOF	31,170	20	8,452	27.0
TCA	327	MIDDLE KRUZOF	15,540	0	5,827	37.4
TCA	328	HOONAH SOUND	97,257	20	24,406	25.1
TCA	329	SOUTH KRUZOF	56,701	0	7,468	13.1
TCA	330	NORTH BARANOF	341,417	2,200	63,396	18.5
TCA	331	SITKA URBAN	120,536	17,610	8,452	6.9
TCA	332	SITKA SOUND	19,475	1,459	7,298	37.4
TCA	333	REDOUBT	75,732	3,739	22,694	29.9
TCA	334	POINT ALEXANDER	126,120	516	12,660	9.9
TCA	338	BRABAZON ADDITION	500,374	0	0	0.0
TCA	339	YAKUTAT FORELANDS	305,871	30,141	58,470	19.1
TCA	341	UPPER SITUK	61,722	418	30,203	48.9
TKA	501	DALL ISLAND	108,260	29,069	51,578	47.6
TKA	502	SUMEZ ISLAND	36,327	837	20,663	20.1
TKA	503	OUTER ISLANDS	102,881	240	46,488	45.1
TKA	504	SUKKWAN	46,145	7,111	13,943	31.2
TKA	505	SODA BAY	76,596	17,867	29,318	38.2
TKA	507	EUDORA	233,933	20,495	95,161	40.6
TKA	508	CHRISTOVAL	7,750	0	5,803	74.8
TKA	509	KOGISH	76,175	9,697	32,776	43.7
TKA	510	KARTA	121,440	8,224	51,601	42.5
TKA	511	THORNE RIVER	112,460	0	54,972	48.9
TKA	512	RATZ	8,349	0	4,146	49.7
TKA	513	SWEETWATER	11,104	0	5,382	48.5
TKA	514	SARKAR	73,565	160	35,335	48.0
TKA	515	KOSCIUSKO	70,216	381	38,621	55.0
TKA	516	CALDER	12,687	0	9,575	75.5
TKA	517	EL CAPITAN	43,604	40	23,316	53.4
TKA	518	SALMON BAY	36,366	60	15,881	43.7
TKA	519	POLK	149,205	23,819	53,605	35.9
TKA	520	KASAAN	8,536	140	3,227	38.4
TKA	521	DUKE	46,785	60	7,695	16.2
TKA	522	GRAVINA	38,952	22,889	16,578	42.5
TKA	523	SOUTH REVILLA	71,358	640	23,807	17.2
TKA	524	REVILLA	138,393	22,870	50,638	36.6
TKA	525	BEHM ISLANDS	2,042	3,484	1,361	66.7
TKA	526	NORTH REVILLA	163,771	1,039	61,763	37.7
TKA	527	NEETS	6,315	0	2,667	42.2
TKA	528	CLEVELAND	193,473	8,512	83,219	43.0
TKA	529	NORTH CLEVELAND	114,158	20	43,509	38.1
TKA	530	HYDER	128,585	1,000	11,882	9.2
TKA	531	NUTKWA	59,318	4,978	29,311	49.4

TABLE 3-111 (Continued)

Unit No.	Area Name	National Forest Acres	Non-Nat. Forest Acres	Tent. Suitable Acres	Tent. Suitable %
TKA 532	FAKE PASS	798	0	738	92.4
TKA 577	QUARTZ	149,107	640	0	0.0
TSA 232	NORTH ETOLIN	46,887	0	17,188	36.6
TSA 233	MOSMAN	57,974	0	21,564	37.2
TSA 234	SOUTH ETOLIN	113,031	0	36,356	32.2
TSA 235	WEST ZAREMBO	6,945	0	2,355	33.9
TSA 236	EAST ZAREMBO	8,990	0	2,937	32.6
TSA 237	SOUTH ZAREMBO	32,288	0	10,333	32.0
TSA 238	KASHEVAROF ISLANDS	16,487	140	7,972	48.4
TSA 239	KEKU	12,126	20	5,311	43.8
TSA 240	SECURITY	41,105	480	15,849	38.6
TSA 241	NORTH KUIU	9,741	0	6,514	66.8
TSA 242	CAMDEN	54,730	0	23,973	43.8
TSA 243	ROCKY PASS	78,976	580	28,356	35.9
TSA 244	PILLARS	28,570	40	16,684	58.4
TSA 245	EAST KUIU	46,271	0	23,880	51.6
TSA 246	SOUTH KUIU	124,065	20	54,469	43.9
Total For All Areas		10,442,893	366,878	2,149,289	

DEMAND ASSESSMENT

Public recreation use of roadless undeveloped lands in Southeast Alaska is light but increasing. Modern technology has made available improved rainwear, camping equipment, high quality ocean kayaks, portable marine radios, and other gear which respond to new trends, or lead the way in creating new demands. While recreation use of the existing roadless areas is generally light (compared to many Wildernesses in other States), some areas now receive use at levels which cause management concern. Bear viewing at Pack Creek in the Admiralty Island Wilderness, steelhead and salmon fishing on some rivers such as the Situk and the Thorne, helicopter tours and landings on the ice fields, and other situations have been of sufficient concern to require separate site-specific management plans in the past several years.

EXISTING DIRECTION

The Tongass Land Management Plan allocated 2,656,000 acres to continued management as essentially roadless, in addition to 5,453,000 acres of designated Wilderness. Based on TLMP and the long-term sale contracts, approximately 11 percent of the non-Wilderness is to be harvested over a 100-year period; all of this harvest is scheduled to occur in areas that are presently roadless. Road construction and timber harvest currently affect about 17,000 roadless acres annually. State selections may also affect the roadless character of an additional 23,000 acres as the selection process draws to a close. TLMP Land Use Designation 2 did not provide detailed management direction for areas where timber harvest and road construction were generally prohibited.

RESULTS OF TLMP IMPLEMENTATION

Since 1979, approximately 170,000 acres that were previously roadless have been roaded and harvested. This represents about one percent of the Tongass National Forest as a whole, or about two percent of the non-Wilderness National Forest. However, since these development activities occur mainly in high volume timber areas, the amount of roadless lands which represent "old growth" are affected more than other types of areas, more rapidly reducing the potential to represent old growth in Wilderness.

OPPORTUNITIES AND CONCERNS

There are two key concerns involved with management of roadless lands. First, to what extent will additional Wilderness designation affect opportunities for economical timber harvest, recognizing that timber production is an important part of Alaska's economy? Second, what is the proper balance for the Tongass in terms of protection of unique, large, unfragmented wildlife habitats and primitive recreation opportunity as a part of the National Wildernesss System?

The opportunity for preservation of unique environments and vast, undeveloped areas appears high. The opportunity for public use of Wilderness and other roadless lands is increasing but remains limited, to some extent, by distance and transportation costs (total visitation to Southeast Alaska is about 320,000 people annually). It is apparent that wildlife and scenery are the major reasons people come to visit Southeast Alaska for recreation and tourism, and that the Forest plays an important role in managing these tourism resources.

SOILS

OVERVIEW

The Tongass National Forest is the largest forest in the National Forest System and presently has within its boundary 139 identified and classified soil series. Soils on the Forest are diverse, reflecting the influence of climate, time, vegetation, parent material, and topography. All of these factors have influenced soil development in Southeast Alaska, but the maritime climate (high levels of rainfall and cool temperatures) appears dominant. Under the maritime climatic influence, all soils have moderately low yearly soil temperatures, are continuously moist to wet, and are mostly acidic (pH 3.0-6.4). A limited number of soils have pH's of between 7 and 8.5 but most are soils that are developing in materials deposited, by glaciers or streams in recent geological time. This lower temperature greatly reduces the rate of organic matter decomposition on the ground surface and the degree to which organic carbons are incorporated into soils. It also allows for development of thick (3 to 16 inches) organic duff layers to accumulate over the top of mineral soils. Thickness depends on the soil series and its respective drainage condition.

SUPPLY/INVENTORY EXISTING

The need for basic soil information, particularly for timber harvesting and roadbuilding, initiated the soil inventory process on the Tongass. These inventories recorded and mapped the soils and their individual characteristics. The first soil inventory under National standards was conducted between 1962 and 1970 on the Tongass. It took place on the north half of Prince of Wales Island and supported the Ketchikan Pulp Company (KPC) long-term sale contract. Minor soil inventories were conducted between 1970 and 1977. The second major effort to conduct national standard soil inventories on the entire Tongass National Forest begin in 1978. Scheduled inventories covering all non-wilderness and some wilderness lands on the Forest were completed between 1987 and 1990. Designated Wilderness was not inventoried, but inventories may have taken place before an area was designated wilderness. Due to management direction on the Stikine Area, soils inventory on Wilderness on the Stikine was completed in the summer of 1989.

Soils were inventoried to intensity orders 3 and 4 (see glossary). Order 3 inventories are adequate for project level planning, while order 4 inventories fill the need for broad planning purposes. Identification of very unstable soil areas, regeneration problems, wetland sites, riparian areas, and soil productivity are only a few of the uses of the soil inventories. Soil inventory data is the basic unit in the Common Land Unit (CLU) base for the Geographic Information System (GIS) for the Forest. For the Revision, soil information from this data base was used for the following: to establish the tentatively suitable timber base, to identify wetlands, to identify riparian ecosystems and riparian management areas for management prescriptions, and to develop the watershed cumulative effects index (see water section).

ORIGIN OF SOUTHEAST ALASKA SOILS

Parent material is the earth or vegetative material in which soils develop. Soils in Southeast Alaska develop in parent materials originating from a variety of geological or vegetative materials including volcanic ash, glacial deposits, bedrock (sedimentary, metamorphic, and intrusive igneous), uplifted marine sediments, and deposits of decomposed plant materials. Two distinguishing soil groups based on parent materials are mineral and organic soils, both of which occur extensively on the Forest.

Mineral Soils

The parent materials of mineral soils originate predominantly from deposits of glacial material and colluvium and residual materials weathered from sedimentary, metamorphic, and intrusive igneous rock. Glacial materials are found in U-shaped

glaciated valleys and lowland areas, and extensive up to 1,500 feet in elevation. Parent material from postglacial ash and pumice are found only on Kruzof, northern Baranof, and southern Chichagof Islands. Extensive areas of marine sediments are located on the northern half of the Forest, while small isolated terraces have been located up to elevations of 500 feet throughout the rest of the Forest.

Mineral soils, technically called Spodosols, are the dominant mineral soils of the Forest. Spodosols are soils that, due to climatic conditions, have several mineral (spodic) layers in which iron, aluminum, and organic matter have been concentrated. Mineral soils account for 7.870 million acres (62 percent) of the total acres of soils mapped on the Forest. With the exception of those located in alpine or estuary areas which support herbaceous vegetation cover, mineral soils on the Forest support the bulk of the Sitka spruce-western hemlock forests. In some spodosols, the iron, aluminum, and organic matter are cemented into hard thin layers (placic horizons) which restrict drainage causing poorly drained soil conditions. Even though other mineral soils lack spodic development, all mineral soils characteristically have thick surface organic horizons (mostly 4-10 inches thick), are mostly acidic (pH 3.0-6.4), have weak structures, are continually moist, and have low clay content. Depending on the series, soil depths range from less than 20 inches to 20 feet or more, and they range from well to very poorly drained. Due to their thick organic surface layers, these soils have high infiltration rates. Surface runoff occurs only locally in saturated depressions or in barely definable ephemeral channels. These soils remain moist year-round.

Organic Soils

Organic parent materials are scattered throughout the Forest. Composed of dead and decomposing vegetation, these parent materials are generally found on poorly drained glacial materials and marine sediment deposits. The Forest's cool yearly temperature and moisture conditions prevent vegetation from decomposing quickly. This results in organic material deposits. Some of these deposits, found in depressions or benches on the land surface on the Forest, have accumulated over thousands of years.

Organic soils, technically called Histisols, in the Southeast environment support either forest and/or herbaceous vegetation. Organic soils that support open areas of herbaceous vegetation are referred to as muskegs. Forested organic soils, because they are poorly drained, are sites of scrubby or reduced forest growth. The exception is a well drained organic soil which supports commercial forests of western hemlock, or western hemlock intermixed with cedars and Sitka spruce. Organic soils account for 2.869 million acres (22 percent) of the total acres of the soils mapped on the Forest.

Organic soils are widely distributed throughout the Forest. They are found from alpine to sea level, and occur on hills, ridgetops, valley bottoms, mountain slopes with considerable slope gradients, and glacially scoured benches and depressions on mountains and hills. They range in depth from just 3 inches to well over 40 feet. Organic plant materials in these soils may be in one or more of the three degrees of plant decomposition. Depending on the soil series, they may even be decomposed to a point of being peat or muck.

Natural water content is the amount of water contained in the voids of organic soils in their natural state. One of the most important characteristics of organic soils is their great capacity for taking up and holding water (Organic soils act somewhat like a sponge). Because they are wet or saturated with water

most of the year, these soils, except for the well drained ones, are poorly to very poorly drained. Muskegs contain surface water most of the year, while coniferous forests underlain by organic soils have water tables five to ten inches below the surface of the duff layer.

High water tables in these organic soils allow for little storage capacity for additional water from either rain or snow. Consistently, most of the precipitation falling on muskegs rapidly runs off the surface, and only the amount needed to recharge the water table infiltrates the soil. The exception to this is during dry periods of two or more weeks. During these periods, water tables in all organic soils are lowered by subsurface drainage. Even though dry periods of four weeks or more may occur, the subsoils of these soil series never become dry. Organic soils supporting coniferous forests are composed of a subsurface organic soil covered by thick organic duff layers. Surface runoff does not occur on these soils, as it does in muskegs, because the organic duff surface is able to absorb the additional amount of precipitation, and these organic soils are on landforms that allow better drainage than muskeg landforms.

The remaining area of inventoried and mapped Forest consist of areas referred to as miscellaneous land units. These land areas include ice, exposed bedrock, ponds, and lakes. They account for 2,053,330 acres (16 percent) of the Forest that has been inventoried for soils.

Effect of Soils on Vegetative Composition

Drainage greatly influences overstory and understory vegetation composition. Well-drained soils support the high volume Sitka spruce-western hemlock forest, with forest growth decreasing as drainage becomes poorer. On the southern half of the Forests, changes occur in stand species composition on the soils with poorer soil drainage conditions. The general rule is, the poorer the soil drainage the more change in plant species composition. As an example cedars (western red and/or Alaska-yellow) increase in number in the forest as drainage becomes poorer. Whereas Sitka spruce may not be present on soils that are somewhat to very poorly drained, and where present on these soils its growth is greatly retarded. On the Chatham and Stikine Areas, except for their very southern areas, tree composition stays nearly the same even though growth decreases as drainage becomes poorer.

Nitrogen and other nutrient elements are present in relatively high amounts in the surface organic horizons and present in low amounts in the lower mineral horizons of the soils. The surface organic horizons supply the bulk of the nutrients for plant growth. Because the soils are moist to very wet throughout the season, plant rooting depth is limited predominately to the surface organic layers and the top few inches of mineral soil where nutrient availability is the highest and more oxygen is available.

Soil Productivity

Soil productivity and its measurement are very important, as it underlies the productivity and quality of all other forest resources. Tree growth, wildlife and fish habitat, and recreation opportunities are associated with soil quality. Soil productivity presently receives the most interest and concern through the management of old- and second-growth timber. Productivity of mineral soils, in Southeast Alaska, in terms of tree growth, ranges from very high on floodplains, till plains, and most other lowlands, to progressively lower as elevation increases, on more northern sites, and on poorer drained soils. Productivity on poorly and very poorly drained organic soils, regardless of elevation or northern extent, is generally much lower than the productivity of mineral soils.

The standard method for measuring soil productivity is to measure the vegetation or crop produced from the soil. In forestry, site index, a measure of tree height of dominant trees at a specified age, is the usual index of soil or land productivity. Determination of accurate site indexes is difficult in Southeast Alaska's uneven-aged old growth because many of trees which are now dominant trees were suppressed for various periods of time (Stephens, et al. 1986). Even-aged stands of natural regeneration in previously logged areas are just now beginning to produce potential site indices for future second growth. In addition to site index, research scientists are studying the effect of proper tree spacing on stand productivity. These studies are in progress.

Soil productivity can be predicted reasonably well from soil type characteristics. Of all soil characteristics, soil drainage and soil depth are responsible for the greatest difference in forest productivity in Southeast Alaska. Stephens, Gass, and Billings (1968) reported that for determining site index, timber-producing soils of Southeast Alaska could be grouped into seven categories based on soil drainage and soil depth. Ford, Farr, and Ping (1988) found that out of four soil characteristics only coarse fragment content was significantly related to site index for Sitka spruce. Cullen (1987) found that out of eight soil characteristics and four landform characteristics used to predict timber volume, soil drainage class described the greatest difference in productivity, and soil depth described the second greatest difference. Although soil depth, coarse fragment content, and drainage reflect the influences of other site factors, these characteristics best relate to timber growth. Soil characteristics and productivity relationships are summarized in table 3-112.

TABLE 3-112
SOIL CHARACTERISTICS RELATED TO SOIL PRODUCTIVITY

Soil Characteristics	Productivity
> 10 inches deep*, well & moderately well drained, non-skeletal.	High
2-10 inches deep*, well & moderately well drained, skeletal; somewhat poorly drained, non-skeletal & skeletal; poorly drained, skeletal.	Moderate
< 2 inches deep*, well & moderately, drained, skeletal & non-skeletal.	Poor
Any depth*, poorly & very poorly drained, non-skeletal.	Poor

* Soil depth is measured from the top of the surface of the mineral soil.

Soil Erosion Sedimentation Mass Movement

Soil erosion in the form of gullies, sheet, or rill erosion is very minor in soils under natural, undisturbed conditions. Under these conditions, the thick surface duff layers that cover the mineral soils protect soil from surface erosion. Mineral soils can be exposed either by natural causes, such as landslides, or management activities, such as timber harvest and road construction. Surface erosion becomes active once the duff layer is removed and mineral soil exposed. Under natural conditions, landslides (soil mass movement) dominate the erosion processes on steep forest lands in Southeast Alaska. The

next highest potential for soil erosion, is road construction and maintenance with timber harvesting (falling, bucking and yarding).

The most common landslide types are debris flows or debris avalanches. These result from failure of a relatively shallow, cohesionless soil mass on a steep slope which has been subject to surface loading, increased soil water levels, removal of mechanical support, or a combination of all three (Swanston, 1974). Other types of erosion, such as surface water erosion in the form of gullies, rill, and sheet erosion, are predominately limited to exposed landslide tracks and streambanks. The principal impact of these erosional processes is on the streams and on the soil productivity. Landslides entering streams deposit an initial large mass of sediment, and then provide a persistent source for surface erosion and the stream sedimentation associated with it, until the slide area revegetates. The delivery of eroded material to streams is more efficient with landslides than by surface erosion. Little is documented or understood about the total impact of sediment from eroded soils being routed through streams in Southeast Alaska and its persistence in them. Landslides seriously retard soil productivity for forest regeneration by first removing the soil mantle down to bedrock or glacial till on upper slopes, and then depositing the debris over productive soils on lower slopes and valley bottoms (Harris, 1967).

The mean frequency of landslides per area of logged and unlogged areas, non-wilderness land base, is shown in Figure 3-33 for the northern Tongass (Chatham and Stikine Areas), the southern Tongass (Ketchikan Area), and the total Tongass (Swanston, unpub. 1989). This figure indicates the relative comparison of landslides for unlogged conditions, logged conditions, and combination of both. On the non-wilderness area of the Forest there currently is an average of one landslide for every 7,030 acres. Total landslide acreage accounts for less than one percent of the Tongass National Forest non-wilderness land base. Landslides are slightly more frequent on logged and unlogged areas on the northern Tongass than they are on the southern Tongass. The frequency data by itself indicates that there are fewer slides on logged areas than on unlogged areas. When compared on a per-acre basis, landslides were approximately one per 2,240 acres on logged areas compared to 1 per 7,470 acres on unlogged areas. Landslides on areas where road construction and timber harvest have occurred are three times as frequent as those on unlogged areas. Although this threefold increase on logged areas seems large, it accounts for only 0.8 percent of the total logged area on the Forest. The inventory data show that landslides on unlogged areas are larger and longer in length than those occurring in logged areas. Data collected in the Maybeso valley on Prince of Wales Island showed that out of the total timber acres, only 31.5 acres were involved in soil mass movements prior to logging (Bishop and Stevens, 1964). During the 10 years of active logging and road construction, this acreage increased approximately four times to a cumulative total of 150.1 acres. Although these measurements appear to have some magnitude, the increase was still a relatively small amount of the forested land of the watershed. This relates very closely to the overall Forest frequency data in Swanston's 1984 to 1986 inventory.

The preceding landslide information relates to the total non-wilderness land base of the Tongass National Forest and should be used as such for reporting results from the inventory data. These data do not always hold true for many individual areas across the Tongass, depending on the area, such as an island, valley, etc. As an example, the landslide inventory frequency data from the northern half of Prince of Wales Island on the Ketchikan Area shows that the number of landslides on an area basis on logged land (19 slides) and unlogged land (210 slides) is

just opposite the overall regional data. Here the inventory data (personal communication with Doug Swanston, October 17, 1989) indicates that there are fewer landslides on an area basis on logged land (1 slide per 6,124 acres) than on unlogged areas (1 slide per 3,660 acres). In addition, where as six percent of the inventoried landslides on logged areas entered Class I and Class II streams on the total Tongass, none of the inventoried slides on the north half of Prince of Wales on logged areas entered Class I and Class II streams.

The Maybeso Valley on the north half of Prince of Wales Island is a good example of landslide frequency in an individual valley. Frequency in this valley relates very closely to the average frequency for logged areas on the Forest and is higher than the average landslide frequency for logged areas on the north half of Prince of Wales Island.

Swanston's data (see Figure 3-34) indicates that 3.2 percent of the total landslides impact fish streams (0.5 percent are impacts from logged areas and 2.7 percent is from unlogged areas). The total number of landslides impacting these streams is very small. Of the 1,277 landslides occurring on unlogged areas, 37 (three percent) impacted fish streams while six percent of the 118 landslides occurring on logged areas impacted fish streams (Figures 3-35 and 3-36).

POTENTIAL

The primary method to influence soil potential is by changing soil productivity through changing a soil characteristic by some type of management practice. As far as is known, soil drainage is the only soil characteristic that would potentially give a measurable response in increased soil productivity.

Changing poorly drained forested soil sites to better drained soil sites would improve soil productivity. More acres of increased soil productivity could be created by this method than by changing all other soil characteristics combined. However, this approach to enhancing productivity is not practical at this time or in the foreseeable future. Although roads are lacking in some areas, the main reason access to some sites is limited is steepness of the land. Equipment used for draining wet areas cannot access many wetland sites. A second reason is that draining some sites is economically infeasible due to present timber market values. Draining and converting muskegs to timber sites is possible, but draining them has the same limitations as draining poorly drained forested soil types.

DEMAND ASSESSMENT

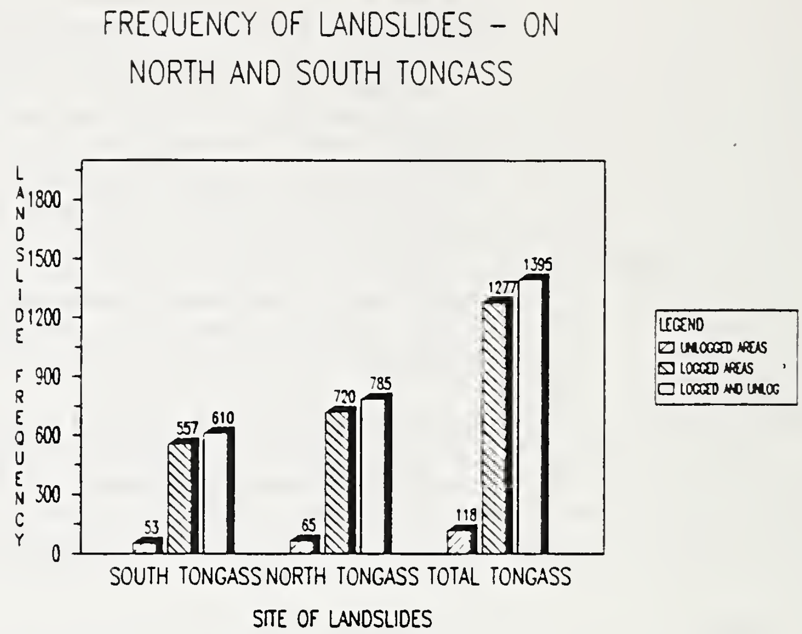
The major demand will be for productive, nutrient rich, undisturbed soils for timber production. With the completion of soil inventories, soil information will be increasingly important for management planning for other resources such as wetland management and protection, recreational site developments, wildlife habitat management, and overall ecological management.

EXISTING DIRECTION

In general national policy directs soils resource management on the National Forests to be in accordance with the objectives in the forest land management plan for the area involved. The Regional Guide contains the policy, objectives, and direction for the Tongass Land Management Plan (TLMP) to meet national policy.

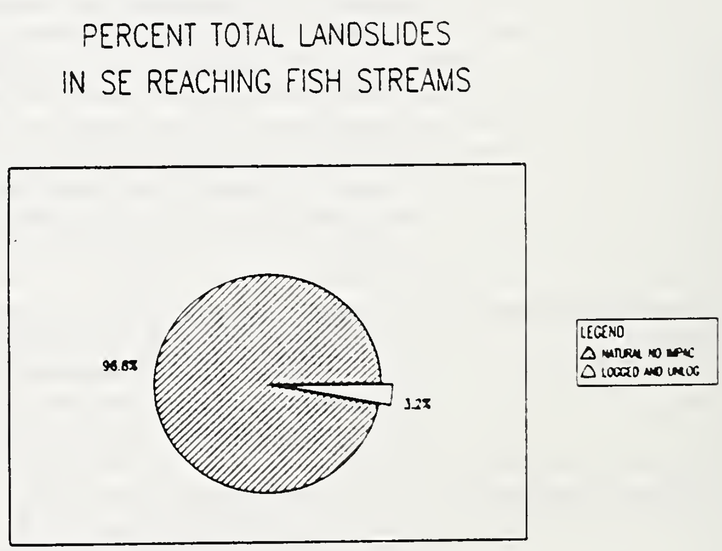
In summary, the TLMP's soil resource management objective was to prevent adverse erosion, to prevent loss of soil productivity resulting from developmental activities, and to rehabilitate disturbed and eroded soils to restore productivity and reduce erosion.

FIGURE 3-33



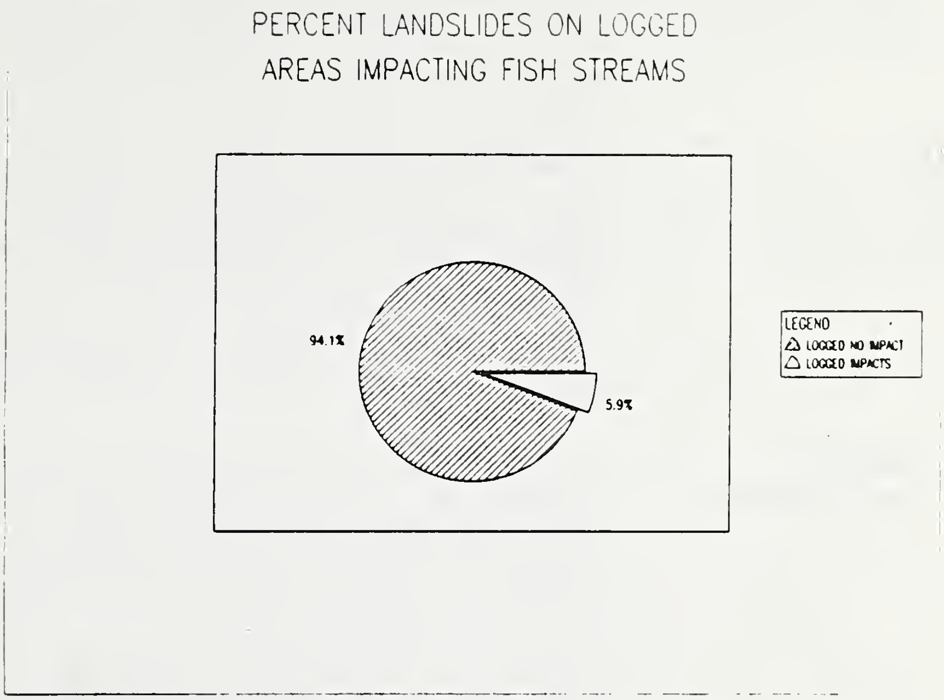
Source: Pacific Northwest Forest & Range Experiment Station. Unpublished landslide inventory data, 1987.

FIGURE 3-34



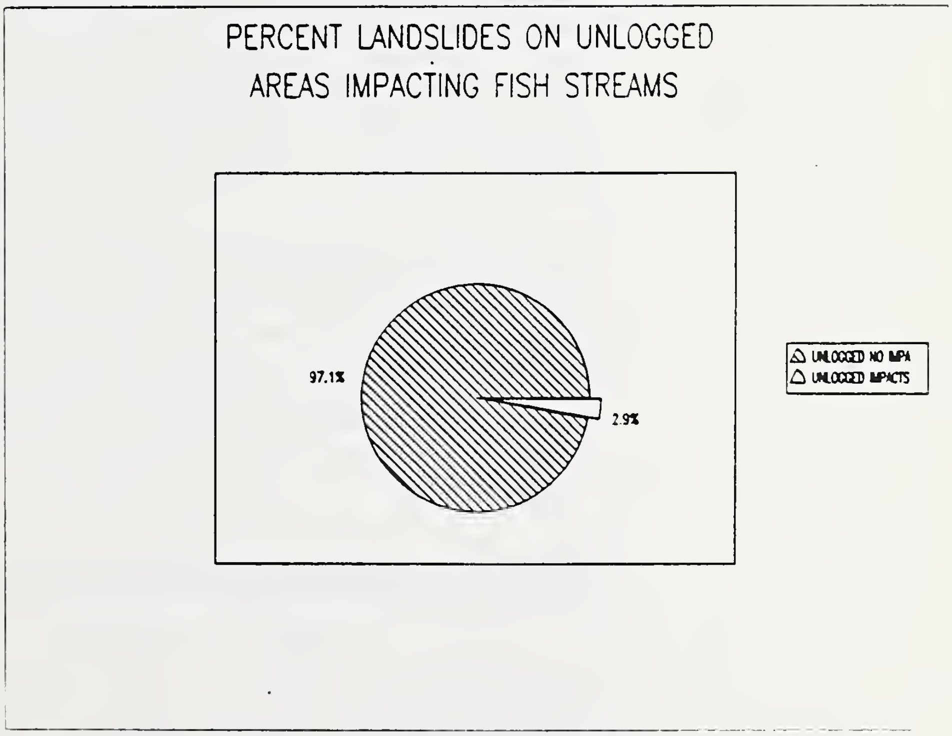
Source: Pacific Northwest Forest & Range Experiment Station. Unpublished landslide inventory data, 1987.

FIGURE 3-35



Source: Pacific Northwest Forest & Range Experiment Station. Unpublished landslide inventory data, 1987.

FIGURE 3-36



Source: Pacific Northwest Forest & Range Experiment Station. Unpublished landslide inventory data, 1987.

The Southeast Alaska Area Guide policies give direction for the accomplishment of the above objective. This policy, in essence, directs that the Forest to conduct a soil resource inventory to identify and describe the soils for all projects significantly affecting soil resources. Data will be collected to determine soil capabilities and limitations, and to provide information necessary for preparing prescriptions to manage and protect the soils and other resources consistent with the goals and policies established in the Guide. In addition, other policy direction in this Guide are essentially used as Best Management Practices (BMP's), which are methods, measures, or practices applied during forest management activities to protect water quality. These BMP's include direction on management activities on braided stream bottom lands, tractor logging, revegetating and stabilizing disturbed soil areas (bared mineral soils) from timber harvest and road construction, logging and road construction on slopes greater than 75 percent, blasting on potential landslide-prone areas, and road construction across deep incised drainages (V-notches).

RESULTS OF TLMP IMPLEMENTATION

Soil erosion, based on the information available when TLMP was written and then implemented, was expected primarily to occur from the 295 miles of new roads that could be required each year to harvest timber. Mitigation measures called for minimizing the impact on soils from road building and other land disturbing activities. The primary impact on soils during and shortly after road construction was a temporary increase in soil erosion before the soils were revegetated. This effect was less than that projected by TLMP. Due to the depressed timber market between 1982 and 1986, fewer miles of road were constructed than had been anticipated. Only 144 miles have been constructed or reconstructed annually since 1980.

Road construction and related activities were expected to convert soils on approximately 2,500 acres annually to a non-productive status. The reduced timber harvest and associated road construction levels resulted in the conversion of only 1,224 acres. The reduction in miles of road not only lessened the amount of soils put into a nonproductive status, but also reduced the predicted amounts of erosion and resulting sedimentation to streams. Additional impacts, especially from timber harvest and road construction activities, were reduced by initiation of the soil protection policies for these management activities.

The 1984 Tongass Land Management Plan Evaluation Report, reported that accomplishment of scheduled soil rehabilitation and stabilization management activities lagged behind established goals. By the end of fiscal year 1989, 100 percent of the soil improvement activities scheduled had been completed. Although a high number of improvement projects had originally been identified, a lack of specific information on their necessity and proposed implementation caused deferral of many of these projects. Scheduled and completed soil resource improvement activities for each Area and the total for the Forest are presented in Table 3-113.

TABLE 3-113
SCHEDULED AND ACCOMPLISHED SOIL RESOURCE IMPROVEMENT ACTIVITIES

	CHATHAM	KETCHIKAN	STIKINE	TOTAL
Acres Scheduled	670	260	340	1,270
Acres Accomplished	700	271	356	1,331
Percent Accomplished	104	104	105	105

OPPORTUNITIES AND CONCERNS

From management's perspective, soil resource concerns revolve around the ability to maximize commodity and amenity resources, while still minimizing potential adverse impacts to soil productivity. This includes the concern that soil erosion resulting from natural conditions or management activities impacts water resource quality and its resulting beneficial uses.

Management opportunities include: the opportunity to enhance soil productivity through revegetation and stabilization of any naturally caused or management caused degraded soil sites; reducing soil erosion through application of research findings and Best Management Practices (BMP) applicable to prevent non-point pollution; and improved allocation of resources through the planning process.

SPECIAL AREAS

OVERVIEW

The Tongass Land and Resources Management Plan Revision process provides the opportunity to inventory, maintain, interpret, and protect areas having unique features or values including archaeological, historical, Native American religious, scenic, geological, botanical, zoological, and paleontological areas. The objective of these special areas is to provide public use, enjoyment, and study when the resource is appropriate for public use and protection of the unique value is available. Special Areas differ from Research Natural Areas in that they promote public use rather than the singular goal of research.

Proposed special areas are selected by evaluating the unique characteristics of the resource, describing their present condition, and then determining long-term preservation goal's in terms of size, quantity of surrounding natural areas, protection needs, and kinds of unique resource values contained within each proposed area.

Special Areas nominated as potential National Natural Landmarks are evaluated to determine if they: contain unique resources of national significance; have an inherent diversity of unique values; are free of disturbance and human intervention: are capable of retaining unique qualities over time; and have exceptional value to research, education, or interpretation or contain critical habitat or unique geologic features.

Cultural resource sites or historic districts that are eligible for or listed on the National Register of Historic Places may be recommended to the National Park Service for designation as National Historic Landmarks. The objective of either designation is to preserve, conserve, and enhance the unique values for that special area.

SUPPLY/INVENTORY EXISTING

The following is a list of the special areas existing on the Tongass National Forest.

Special Areas

Mendenhall Glacier Recreation Area. This area was established by the President of the United States in 1947 and contains 5,791 acres.

Ward Lake Recreation Area. This 440-acre special area was established in 1948 and later, on August 17, 1975, was withdrawn from mineral entry by the President of the United States.

Walker Cove-Rudyard Bay Scenic Area. Presently contained with the Misty Fiords National Monument and Wilderness established in 1980, the 93,540-acre Walker Cove-Rudyard Bay Scenic Areas was designated by the Regional Forester in 1952.

Admiralty Lakes Recreation Area. Established by the Regional Forester in 1965, the 8,710-acre Admiralty Lakes Recreation Area is currently located within the Admiralty Island National Monument and Wilderness.

New Eddystone Rock Geological Area. This one-acre area was established by the Regional Forester in 1966 and is currently located within the Misty Fiords National Monument and Wilderness.

Hubbard Glacier Geological Area. Located within the Russell Fiord Wilderness, the 46,000-acre Hubbard Glacier Geological Area was established in 1986 by the Secretary of the Interior.

Tracy Arm-Ford's Terror Scenic Area. This 283,000-acre Scenic Area was designated by the Secretary of Interior in 1960. It is currently located in the Tracy Arm-Ford's Terror Wilderness.

National Historic Landmarks

Fort Durham Historic Landmark. One National Historic Landmark is partially located on the Forest. Fort Durham was established in 1840 in Taku Harbor as one of three Hudson's Bay Company trading posts established in an area controlled by the Russian American Company. This site represents part of the British attempt to gain some control of the North Pacific fur trade in competition with Russia and the United States. About 5 acres of the site are privately owned, with an area approximately 8 feet by 150 feet located within the Tongass National Forest.

National Natural Landmarks

The Tongass National Forest has no designated National Natural Landmarks. A National Natural Landmark is an area of national significance designated by the Secretary of Interior which contains an outstanding representative example (s) determined to best represent the Nation's natural history. This program is administered by the National Park Service Division of Natural Landmarks. This Division determines which areas nominated by State and Federal agencies merit further consideration as potential Natural Landmarks.

POTENTIAL

A list of potential Special Areas with unique values has been compiled from the recent Tongass Land and Resources Management Plan Revision public scoping comments and additional suggestions from the personnel at the three Administrative Areas. No effort has been made at present to prioritize these areas. Prioritizing of special areas will be accomplished after unique attributes and selection criteria have been analyzed by IDT review.

Special Areas

Seven established geographic provinces are utilized to identify locational stratification when recommending special areas, these include:

- Yakutat Forelands
- Lynn Canal
- Coast Range
- Northern Outer Islands
- Northern Interior Islands
- Central Interior Islands
- Southern Outer Islands

Rating Criteria For Special Areas

The following is a list of potentially unique features with suggested evaluation criteria and numerical ratings that have been previously established:

Scenic areas. Protect and enjoy scenic beauty. Criteria: Outstanding scenic beauty. Rank by: Variety Class (VC) (A-C) and Existing Visual Condition (EVC) (1-6).

Geological areas. Protect geological features and natural environment. Criteria: Outstanding geological features or processes. Rank by: General Criteria (1-4) (See next section).

Botanical Areas. Protect plants and their environment and provide for observation and study. Criteria: Significant plant communities rarity, beauty, ecologic aspects. Rank by: National Natural Criteria.

Zoological Areas. Protect significant heritage as pertains to fauna. Criteria: Rare or outstanding zoological features. Rank by MIS species (1-5).

Paleontological Areas. Protect areas containing select specimens of fauna and flora spanning geological times. Criteria: Rare or outstanding specimens. (Fossils are subject to the protection provisions of the Antiquities Act [FSM 2360].) Rank by: National Natural Criteria.

National Recreation Areas. All natural resources are available for use within policies and decisions which accord major emphasis to recreation and aesthetic values. Criteria: Outstanding combinations of outdoor recreation opportunities, aesthetic attractions, and proximity to potential. Rank recreation values by: Primitive recreation value (1-5); Semiprimitive value (1-5); Concentrated recreation value (1-5); Wilderness Attribute Rating (WARS) (0-28).

Archaeological. Protect archeological features from vandalism and other threats; interpret for benefit of public. Criteria: Significant evidence of use by aboriginal people with site integrity. Rank by: Archaeological survey status/documentation and National Register criteria (36 CFR 60.4, 65.4) and status.

Historical Areas. Preserve historic evidence and environment suited to the historic time. Criteria: Features having historic integrity that contain significant details of historic events. Rank by: Archaeological survey status and National Register criteria (36 CFR 60.4, 65.4) and status.

Criteria for Nominating National Natural Landmarks

Criteria used to evaluate National Natural Landmark status of ecological and geological resources include the following:

1. The nominated example must best illustrate the resource represented.
2. The nominated example must best represent natural undisturbed conditions.
3. The nominated example must best represent a rare type of resource.
4. The nominated example must contain a high number of high quality examples of different natural resures.
5. The nominated example must best represent value for scientific discovery or concept, possess an exceptional extensive record of research, or offer unusual opportunities for public interpretation of the natural history of the United States.

Areas nominated are evaluated by the Division of Natural Landmarks and the recommendations are forwarded to the Director, National Park Service, who ensures that procedural requirements are met and nominates these areas to the Secretary of the Interior for approval and designation. Special Areas on the Forest may be nominated as National Natural Landmarks if they are evaluated and determined to meet the national criteria (36 CFR 62).

General Rating Criteria

The following criteria were used for those geological special areas where significance ratings were not previously established by other means (American Cave Conservation Association 1985):

1. Unique values of outstanding national significance which are extremely sensitive or vulnerable to damage or are immediately threatened.
2. Unique values of outstanding national significance which are moderately sensitive and vulnerable to damage or are not immediately threatened.
3. Unique values of regional significance which are extremely sensitive or vulnerable to damage or are immediately threatened.
4. Unique values of regional significance but which are moderately sensitive or vulnerable to damage and are not immediately threatened.

Specific Criteria of Significance for Potential National Historical Landmarks

Although National Historic Landmark nominations must meet the significance criteria for the National Register of Historic Places (36 CFR 60), they also must address additional criteria that includes six categories of national significance (36 CFR 65).

Cultural properties eligible for National Historic Landmark status are those that meet the following criteria:

1. Properties associated with events that have made a significant contribution to, and are identified with, or that outstandingly represent, the broad national patterns of United States history from which an understanding or appreciation of those patterns may be documented.
2. Properties that are associated importantly with the lives of persons nationally significant in the history of the United States.
3. Properties that represent some great idea or ideal of the American people.
4. Properties that embody the distinguishing characteristics of an architectural type specimen exceptionally valuable for study of a period, style or method of construction.
5. Properties that are composed of integral parts of the environment not sufficiently significant by reason of historical association or artistic merit to warrant individual recognition but collectively compose an entity of exceptionally historical or artistic significance, or illustrates a way of life or culture.
6. Properties that have yielded or may be likely to yield information of major scientific importance by revealing new cultures. Such sites are those which have yielded, or which may reasonably be expected to yield, information affecting theories, concepts and ideas to a major degree.

This standard requires that potentially recoverable data are likely to revolutionize or substantially modify a major prehistoric or historic concept, resolve a substantial historical or anthropological debate, or close a serious gap in a major theme of United States prehistory or history.

National Historic Landmark candidates must possess a substantially higher degree of integrity than those of National Register designation. This higher degree of integrity may include, but is not limited to, unusually intact or undisturbed deposits or features and archaeological resources exhibiting a demonstrably high degree of preservation. State and Federal agencies prepare nominations for cultural resource sites or historic districts that are eligible for, nominated to or listed on the National Register of Historic Places.

Nominations for National Historic Landmarks must be relevant to the criteria established by the National Historic Landmark survey. The nominations will be reviewed by the appropriate National Park Service Regional Office; the Chief Historian, History Division, Washington Office; an ad hoc panel; and the Associate Director, Cultural Resources, Washington Office. Final nominations are reviewed by the National Park System Advisory Board and final selections are made by the Secretary of the Interior (NPS Technical Brief No. 3, December 1988).

Identification of Unique Values

A matrix for the identification of unique values associated with identified special areas will be developed for the Tongass Plan Revision from all related resource information available in the GIS data base. This information will allow evaluation of unique features for significance of all resources and allow for the possible elimination of those areas that do not meet the criteria for outstanding national or regional criteria.

POTENTIAL SPECIAL AREAS

The following is a list and brief description of unique areas with potential for special area classification.

Chatham Area

Yakutat Forelands Geographic Province

Akwe Beach. An exceptional example of coastal dune development, as well as the only extended length of sandy beach in south coastal Alaska, is displayed at Akwe Beach. This potential special area contains unique botanical species, dune and swale wetlands plant communities, a variety of wildlife species, and recreational opportunities (See RNA section).

Hanke Island. This potential special area contains unique zoological values.

Pike Lakes. Pike Lakes are a potential special area because they are the only lakes in coastal Alaska that are inhabited by the northern pike (See RNA section).

Yakutat Forelands Archaeological District. This potential special area contains a number of archaeologcial and historic sites that are significant regionally and nationally and is a potential National Historic Landmark.

Lynn Canal Geographic Province

Dayebas Creek. This area contains the highest summer temperatures and least annual precipitation in Southeast Alaska. Due to its special climatic conditions, uncommon forest and tundra plants and unusual forest types are found here. The area also contains significant mountain goat habitat, an old hanging glacial cirque, a large waterfall and other unique geological features (See RNA section).

White Pass. This area is associated with the Alaska Gold Rush; it contains scenic values. Significant historic values are contained within a National Historic Landmark on lands administered by the National Park Service and the State of Alaska.

Coast Range Geographic Province

Windham Bay. Associated with the first discovery of gold in Alaska, this potential special area contains a number of archaeological and historic sites.

Southern Chilkat Peninsula. Containing a number of archaeological and historic sites that are regionally and nationally significant, this potential special area is also a potential National Historical Landmark.

Northern Outer Islands Geographic Province

Inian Islands. This potential special area contains unique historic values.

Mount Edgecumbe/South Kruzof Island. This potential special area contains unique geological features, a variety of botanical and wildlife species, and recreational opportunities.

Myriad Islands. The Myriad Islands are a set of numerous wave-battered, low elevation islands fronting the open North Pacific Ocean. An excellent example of Pacific Ocean island habitats and ecosystems exist in the potential Myriad Islands Special Area.

Lake Eva. Lake Eva is a low elevation morainal lake. As a potential special area it contains archaeological and historic sites of regional and national significance and abundant recreational opportunities, as well as a highly productive sockeye fishery with an active history of research.

Redoubt Lake. Redoubt Lake contains unique aquatic ecosystems. The Redoubt Bay watershed has a history of logging dating back to Russian colonial times. The historic site is of regional and national significance and is a potential National Historic Landmark (See RNA section).

Harbor Mountain. With easy access from Sitka, this potential special area is a unique motorized recreational opportunity that provides access to alpine areas and outstanding scenery.

Krestoff Sound/Dry Pass. This potential special area contains a variety of geological features, botanical and wildlife species, and recreational opportunities.

Kalinin Bay/Sea Lion Cove. This potential special area contains unique geological features, a variety of botanical and wildlife species and recreational opportunities.

Hidden Falls. This potential special area contains an archaeological site that is regionally and nationally significant and is a potential National Historic Landmark.

Northern Interior Islands Geographic Province

Gambier Bay. This bay contains the shoreline of Snug Cove, a shallow arm of restricted tidal flow, and a segment of rocky shoreline along Stephens Passage. It contains significant nesting habitat for bald eagles, supports a high population of Sitka black-tailed deer, brown bear, and is heavily used by shorebirds, as well as by migrating ducks and geese. A variety of botanical species and established recreational use also exist here (See RNA section).

Tenakee Portage. This potential special area has historic significance and established recreational use.

Tonalite Creek. An excellent example of pristine of riparian spruce, productive bear and fisheries habitat, western mountain hemlock, muskegs, and yellow-cedar vegetation are all contained in the potential Tonalite Creek Special Area (See RNA section).

STIKINE AREA

Coast Range Geographic Province

Twin Lakes. An extensive floodplain habitat in its braided floodplain, as well as two unique vegetation types, make Twin Lakes a potential special area. Geothermal hot springs systems also exists in the area (See RNA section).

Anan Creek. Exceptional fisheries and bear habitat as well as recreational opportunities characterize the potential Anan Creek Special Area (See RNA section).

Central Interior Islands Geographic Province

Port Camden Fossil Area. This potential special area contains unique botanical fossils estimated to be 40 million years old (See RNA section).

South Etolin Island. This potential special area contains a unique old-growth forest originating from fire, a known native resource area for red cedar, and recreational opportunities (See RNA section).

Duncan Salt Chuck. Duncan Salt Chuck is the finest example of a salt chuck on the Tongass. This potential special area also contains unique botanical species and a variety of wildlife species (See RNA section).

West Duncan Uplift Area. The post-glacial landscape, an example of isostatic rebound, in this potential special area is exceptional. The uplifted marine deposits contain fossils of marine shellfish. Its level, low-elevation plains are one of the most extensive wetlands and muskeg surfaces on the Tongass National Forest (See RNA section).

Keku Islets. This potential special area contains a variety of geological features, botanical and wildlife species, archeological/historical sites, and recreational opportunities.

Rocky Pass. A variety of scenic, geological features, botanical and wildlife species and a unique waterway that provides recreational opportunities characterize the potential Rocky Pass special area.

Halleck Harbor/Kuiu Island. This potential special area contains unique geological features, historic sites and recreational opportunities.

Brownson Island Salt Chuck. Another excellent example of a salt chuck and habitat that contains a variety of botanical and wildlife species and recreational opportunities is the potential special area at Brownson Island Salt Chuck.

Blind Slough. This potential special area contains a variety of botanical and wildlife species, scenic and recreational opportunities.

Bay of Pillars. This potential special area contains unique geological features and recreational opportunities.

Tebenkof Bay. Containing a number of archaeological sites that have regional or national significance, the Tebenkof Bay area is a potential National Historical Landmark.

KETCHIKAN AREA

Coast Range Geographic Province

Blue Lake. This potential special area contains lava flows and various volcanic features that originated in British Columbia during the late 1700's and are unique within the Forest. The lake gets its name from the blue or aquamarine color of the water that is caused by the Tyndall effect, the refraction of light on the suspended clay particles in the water.

Chickamin River. The potential Chickamin River special area contains a variety of wildlife and botanical species as well as the potential for a variety of recreational experiences.

Central Interior Islands Geographic Province

Bailey Bay Hot Springs. A hot springs and the unique botanical species that surround it are the main attractions of Bailey Bay Hot Springs. In Southeast Alaska nearly all hot springs have been developed for resorts or public recreation. Modification of the springs for these purposes has resulted in the destruction of specially adapted high temperature organisms and delicate or unique rock formations. Bailey Bay Hot Springs are reported to have been tapped to some unknown degree for a resort before 1940, however, the main vents, pools, and seepage slope are reported to be in nearly pristine condition. Bailey Bay Hot Springs has the highest surface temperature of any hot spring in Southeast Alaska. This area also contains a partially developed area for recreational use of the hot springs (RNA Section).

Naha River. This potential special area contains a variety of wildlife and botanical species, historic salteries, canneries, hatchery, shipwreck, and prehistoric native sites which would have regional and national significance as an historic district and potential National Historic Landmark. Recreational cabins and shelters are accessed from this area.

Southern Outer Islands Geographic Province

Several outer islands have potential as special areas, containing a variety of unique wildlife and botanical species, limestone cave formations, historic and archaeological sites of regional and national significance and recreational opportunities. They are: Noyes Island, Baker Island, Goat Island, San Fernando Island, Lulu Island, St. Ignace Island, Dall Island, Western Sumez Island/Cape Feliz.

Sulzer Portage. This potential special area contains a variety of wildlife and botanical species and an historic portage associated with mining activity.

Heceta Island. This potential special area contains approximately 25 historic and prehistoric sites which range in age from as old as 8,000 years to an origin in the 1900's. These sites individually and collectively have regional and national significance.

Hollis Mining District. The community of Hollis began as a mining camp at the turn of the century; its mining district containing historic remains of mining activity has potential as a special area.

Calder/Virginia Mountain. This potential special area contains unique botanical species and geological formations including glacial cirques and limestone formations (See RNA section).

Disappearance Creek. Disappearance Creek is a classic disappearing stream or underground river typical of limestone or karst regions. This potential special area contains unique limestone geological features, including the possibility of caves and associated organisms and wildlife species (See RNA section).

Johnson Lake. The potential Johnson Lake special area contains an exceptional riparian spruce habitat, high fisheries values, and at least two plants which are uncommon in the southerly portions of the Tongass (See RNA section).

Naukati Bay. The 150- to 250-year-old stands around Naukati Bay are thought to have arisen from catastrophic windthrow events. They are also productive forests which grow on marble-limestone parent materials. The Naukati special area would provide an essential baseline condition for studies of forest-soil interrelationships, forest productivity, and forest-wildlife relationships. Research on deer habitat use, understory vegetation growth, productivity and nutrition have already been conducted here. This potential special area contains a variety of botanical and wildlife species and numerous prehistoric sites which have regional and national significance (See RNA section).

Thunder Mountain. The potential Thunder Mountain special area includes a possible glacial refugium, alpine plants uncommon on the Tongass National Forest, outer coastal forest types of the southern Tongass Forest, and potential habitat for the marbled murrelet (See RNA section).

Nutkwa River. This potential special area contains excellent examples of riparian spruce and a variety of vegetative and hydrologic types (See RNA section).

Sarkar Lakes. This potential special area contains a significant run of sockeye salmon, numerous prehistoric sites, and recreational opportunities (See RNA section).

Klawock Mountains. This potential special area contains a variety of botanical and wildlife species, geological features and recreation opportunities.

DEMAND ASSESSMENT

The Tongass National Forest is well-known for its unique natural qualities. The Tongass Land Management Plan recognized a need for additional planning efforts to establish special areas. Special areas were managed with localized standards and guidelines that were basically a refinement of the Tongass Land Management Plan.

EXISTING DIRECTION

Existing direction for managing special areas is located in the Code of Federal Regulations (36 CFR 251, 36 CFR 294), the Forest Service Manual 2300, the Alaska Area Guide, and the Alaska Regional Guide. Management policies include the following direction from the Alaska Regional Guide (USDA Forest Service 1983).

REGIONAL GUIDE

1. Special area planning efforts are a refinement of the existing Tongass Land Management Plan. Planning documents will:
   a. Produce localized standards and guidelines.
   b. Tie to the program budget, which includes potential and probable management practices.
   c. Be accomplished within the Forest Service planning process, with special criteria provided by Forest Service Manual, legislation, regulations, and policy (i.e., Forest Service Manual wilderness planning direction, long-term contract policy).
   d. Vary in format according to the criterion driving the planning process. Environmental disclosure documentation (Environmental Assessment and/or Environmental Impact Statements) and subsequent Records of Decision will recognize these Special Area Plans as technical amendments to the approved Forest Plan (Alaska Regional Guide: 3-46).

AREA GUIDE
Criteria for Establishment

The Alaska Area Guide (USDA Forest Service, 1977) provides the following direction for special areas.

1. Manage principally for recreation use substantially in a natural condition and on which certain other uses may or may not be permitted. May be classified by the Regional Forester if the area is less than 100,000-acres. Areas of 100,000-acres or more will be classified by the Secretary of Agriculture.
2. Designate or recommend designation of special zones under the authority granted in 36 CFR 294 when such action is desirable to give recognition to special and unique values or to give public assurance of continuity between successive offices in special management direction for the area (FSM 2360).

RESULTS OF TLMP IMPLEMENTATION

The Hubbard Glacier Geological Area is the only special area nominated or designated since implementation of the Tongass Land Management Plan.

OPPORTUNITIES AND CONCERNS

The Forest has the opportunity to designate, manage, and protect special areas through interdisciplinary team review after developing carefully defined criteria and policy, with periodic review and provision for reclassification and public involvement. The current direction should be reviewed and updated to insure that unique values and special areas are considered in Forest planning.

Current multiple-use activities could limit opportunities to maintain unique values and, therefore, limit the potential to allocate areas to special area status. In some instances, disturbance from project activities and increased public recreation and use may create overuse of the unique values. Special management considerations will be necessary within and adjacent to areas with unique values.

The establishment of special areas or national landmarks could be limited by a perceived lack of interest from the public, or from delay in the development of establishment reports and specific management plans and coordinating efforts with the National Park Service.

Unique values within the Forest are abundant and when inventoried, provide the opportunity to avoid potential erosion of special values. A special areas inventory will not only provide the basis for protection of unique resources but also new recreational, educational, and interpretive opportunities for Forest visitors.

STREAM AND LAKE RIPARIAN

OVERVIEW

Riparian areas are defined, in Forest Service Manual 2526, as geographically delineable areas with distinctive resource values and characteristics that are comprised of the riparian and aquatic ecosystems, and wetlands. The aquatic ecosystem consists of water habitats of rivers, streams and lakes, the plants and animals which live within the streams, and their habitats. Riparian ecosystems are the transition areas between the aquatic (water) ecosystems and the adjacent upland (terrestrial) ecosystems. Riparian areas have soil characteristics and/or distinctive vegetative characteristics whose presence is directly influenced by water (an aquatic ecosystem).

Riparian areas are extremely important to fish, wildlife, commercial timber, and recreation. They may also be locations where roads are easily built. The following assumptions are made about the aquatic and riparian ecosystems in Southeast Alaska.

1. Given the continual moist conditions of the Tongass, riparian ecosystems influenced by water tables which are near the surface have better-defined riparian area habitat zones than those influenced by surface water.
2. Riparian ecosystems have a more diverse and unique plant composition than upland areas. This appears to be a function of soil factors combined with microclimatic contraints, such as a lack of light or low temperature (Alaback and Sidle 1986).
3. Mineral soils in riparian ecosystems have characteristics associated with saturated soil conditions.
4. Riparian areas are important sources of ecosystem diversity.
5. Riparian areas are valuable producers of many resources. Conflicts between resource uses in these areas are common.

SUPPLY/INVENTORY
EXISTING

Actual measured riparian area data for Southeast Alaska is very limited. Because this baseline data is lacking, other resource inventory data must be used to define riparian areas and their characteristic ecosystem components. The data available to define riparian areas includes soil, plant association, channel type, and landform inventories. A methodology for identifying and mapping riparian areas using these inventories has been proposed (West, Paustian, and Martin, 1989). Concepts from this proposal will be used, in part, to describe the existing riparian resources on the Forest.

In addition to influencing the overall ecosystems in Southeast Alaska, the strong maritime climate also greatly influences riparian area characteristics. Two major factors influencing the characteristics and number of riparian areas on the Forest are soils drainage and surface water. While some riparian areas possess distinct or easily definable characteristics identified with riparian or aquatic ecosystems, others do not.

Even though riparian areas can be identified and described using available resource inventories, actual mapping and inventorying of riparian areas has not been done. Due to the complexity and variable size, riparian areas probably will never be mapped except through the Geographic Information System (GIS) using other resource data. Even with the GIS only those riparian areas associated with unconfined stream channels will be mapped. In the future, existing riparian areas will be protected and managed within planned and established buffered areas referred to as riparian management areas. Riparian management areas are discussed in Chapter 4 of this document.

STREAMSIDE AND LAKESIDE RIPARIAN AREAS

These extremely dynamic systems are best described by their aquatic ecosystems. Aquatic ecosystems consist of river and stream water habitats and the plant and animal life which live in them. The aquatic ecosystems of rivers and streams are located and contained in stream channels or near stream channels; while the water habitats of lakes are often contained in topographic depressions. For the purposes of this discussion, a channel is defined as "an open conduit either naturally or artificially created, which periodically or continuously contains moving water, or which forms a connecting link between two bodies of standing water" (Rechard and McQuisten).

Stream classification systems group all stream channels, river channels, and lakes into two broad groups: confined and unconfined (Marion et al, unpub. 1986). Stream channels in riparian areas may be either confined or unconfined. Confined channels are usually found on mountainslopes and hillslopes, while unconfined channels, including lakes, are found on dissected footslopes, floodplains, alluvial fans, and depressional areas.

Confined Stream Channels

Confined channel riparian areas are found in upper mountain valleys and on mountain slopes. These riparian areas are more often stream- than river-related. The streams themselves are steep to moderately steep and are usually confined by steep side slopes. The steep channel banks are usually composed of large material, either bedrock or well-packed boulders, rubble or cobbles. Contained streams and lakes generally stay within their channels and, because of this, have little effect on the moisture regime of the uplands adjacent to them.

The riparian ecosystems of confined stream channels are often narrow strips of poorly drained soil and associated vegetation. Alaback and Sidle (1986) found that the riparian ecosystem of this channel type had considerably more diverse and unique plant types than adjacent uplands, but also found that most of the species adapted to the riparian ecosystem occurred on wet soils within 15 feet or less on both sides of the stream channel. The soils of these riparian ecosystems indicate hydric conditions, meaning that a water table is present, so the soils are virtually free of dissolved oxygen for long enough to develop anaerobic (without oxygen) conditions in the upper part of the soils. The vegetation is generally a mosaic of many different types of coniferous forest- shrub- and forb-dominated plant communities. It is not unusual for the riparian ecosystem to be part of an extensive wetland habitat, especially a forested wetland. In nearly all cases, the riparian ecosystem will meet the criteria established for wetlands, and thus the riparian ecoystem could be classified as a wetland.

The overstory riparian vegetation, when present, ranges from mixed stands of Sitka spruce, western hemlock and mountain hemlock to mixed stands of spruce, hemlock, Alaska-cedar and red cedar. Sitka or red alder may be found adjacent to streams in many of these confined stream channels. Usually, an assortment of understory shrub plants--including blueberry, huckleberry, devil's club, salmonberry, and salal--can be found as part of the riparian vegetation. Herb and fern understory plants are extremely varied in composition and constancy throughout the Tongass. The dominant herbaceous plants that can be found within riparian ecosystems include skunk cabbage, deer cabbage, bunchberry, cowparsnip, and several types of ferns.

Sometimes, because of the channel shape and surrounding topography, a stream has no riparian (water-influenced) ecosystem, and the stream is bounded instead by an

upland (terrestrial) ecosystem. This lack of riparian area is usually associated with the high gradient contained stream systems described in the fish and water sections of this chapter.

In confined stream riparian areas, upland soils and plant communities influence the productivity of the aquatic ecosystems more than they are influenced by them. If the stream does influence adjacent vegetation and soils, this influence often extends to the break in slope above the stream channel. The terrestrial trees and shrubs provide overhanging, tall shade cover for the aquatic ecosystem. The trees, shrubs, and soils also provide the aquatic ecosystem with a year-long input of mineral and organic debris. Channel areas become important nutrient collection zones, although the high velocity of these streams allows only a limited amount of nutrient processing to occur.

Unconfined Stream Channels

Streamflows in unconfined channels are often poorly contained within the channel banks. Unconfined streams are usually located on fans/dissected mountain footslopes and valley floodplain landforms. Riparian areas associated with unconfined channels may be flooded by overbank flow (2 year floods or greater) during high seasonal runoff or even by individual storms. Depending upon streambank and channel stability, stream channels often migrate or are abandoned during these floods or storms. Ponds created during these floods or storms are rare on alluvial fan channels, but the same increased streamflow on floodplains often results in frequent ponding in such channel areas as oxbows, sloughs, backwater overflow channels, and swales. These areas usually become wetlands.

Unconfined riparian ecosystems are frequently discontinuous and often interspersed with upland ecosystems. On the islands in Southeast Alaska, the riparian ecosystem vegetation communities are dominated by a widely-spaced overstory of Sitka spruce and western hemlock with devil's club, salmonberry, currant, and alder in the understory. Western hemlock plant communities and others may occur on elevated sites which are not subject to flooding or that do not have a high subsurface water tables. Mixed stands of Sitka spruce and red alder are common at the mouths of larger stream systems. On the mainland, riparian ecosystems, such as those along the large glacial rivers and on the broad glacial outwash plains at Yakutat, may contain hardwood trees, such as cottonwood, or mixed stands of coniferous and hardwoods trees. Due to the openness of the forest, shrub-dominated plant communities of alder, salmonberry, currant and/or devil's club occur in narrow bands or in larger patches in the more active alluvial sites. Upland riparian areas may include characteristics of riparian areas associated with wetlands.

Interaction between riparian areas of unconfined streams goes both ways between adjacent landforms and streams. Mass transfer of nutrients and organisms occurs through bank erosion, channel migration and overflow, leaf fall, and blowdown/tree fall. Unconfined streams are important nutrient sources and processing zones, and they generally contain a richer diversity of organisms than confined channels. Hardwoods provide nitrogen-rich inputs for short, concentrated periods in the spring and during leaf fall in the autumn. Coniferous vegetation provides year-long input of organic debris, which helps maintain the aquatic insect community throughout the year. Some unconfined streams and rivers may be so broad that the adjacent upland ecosystems do not directly influence their riparian areas.

Fans/Dissected Footslopes

Alluvial fan and dissected landforms are found at the mouths of confined stream channels at the bottom edges of mountain and hillslopes. Streams and landforms range in gradient from 0 to 30 percent. The former occurs on the fan toe, while the latter occurs at the slope break where the fan joins the higher mountain or hillslope. Because these landforms are fan shaped, the riparian areas associated with them are generally wider along the landform bottom and get progressively narrower upslope. High energy water flows, of low to moderate magnitude (volume), are delivered to fans from their upstream drainage basins. Short periods of overbank flows are caused by debris slides or flash floods. These infrequent debris slides and flash floods deliver high volumes of coarse sediment which is quickly deposited along the channel banks, and often covers the soil surface of the riparian ecosystem adjacent to the stream. During debris slides or flash floods stream channels often migrate or are abandoned.

Soils on alluvial fans and dissected footslopes are often coarse textured and gravelly materials of mixed alluvial and colluvial origin. Although these soils are loose, their particle size makes them fairly resistant to erosion. They are well drained and do not show any high water table characteristics; if high water tables are present during some period of the year, it is not long enough to cause hydric soil conditions.

Riparian plant communities, if present on alluvial fans and dissected footslopes, are discontinuous and often interspersed with non-riparian plant communities. Sitka spruce and associated understory plant species occur along the actively flooded stream channels and on sites with subsurface water flows. Western hemlock and associated understory plant species and other plant communities occur on elevated sites not subject to flooding or a high oxygenated subsurface water table. Wetlands may be located around the edges of the fans but are usually not part of the alluvial fan's riparian ecosystem.

Floodplains

Floodplain riparian areas occur in the bottoms of U-shaped valleys and short, narrow valleys between mountainslopes. These riparian areas encompass the channel banks, active channel floodplains, sloughs, backwater overflow channels, ponded swales, and higher inactive stream terraces which have high water tables. Riparian areas extend in both directions from the active aquatic ecosystem channel across the valley bottom to the footslopes at the valley sides or the toes of alluvial fans.

Floodplain channels banks are composed of unconsolidated water-deposited sediments. High volumes of sands, gravels, and organic materials are delivered to active floodplain channels and the surrounding floodplain by seasonal flooding. Moderate energy streamflows of moderate to very high volume (magnitude) are delivered to the riparian areas from upstream basins. Channel migration and braiding occurs with varying frequency and extent depending on the bank and bed stability.

Floodplain soils erode easily during floods, but even with their fluctuating water tables, because their groundwater is highly oxygenated, floodplains are well-drained. Riparian ecosystems under these conditions would not be classified as wetlands. High water tables, along with frequent flooding, cause ponding in off-channel areas such as sloughs, ponded swales, and backwater overflow channels. These conditions create wetlands which are usually part of the riparian ecosystem.

Floodplain riparian ecosystems are frequently discontinuous and often interspersed with upland ecosystems. On the islands in Southeast Alaska, the riparian ecosystem is dominated by a widely-spaced overstory of Sitka spruce and western hemlock with devil's club, salmonberry, currant, and alder in the understory. Mixed stands of Sitka spruce and red and Sitka alder are common at the mouths of larger stream systems. On the mainland, riparian ecosystems, such as those along the large mainland glacial rivers and on the broad glacial outwash plains at Yakutat, may contain hardwood trees such as cottonwood, or mixed stands of coniferous and hardwood trees. Due to the openness of the forest, shrub-dominated plant communities of alder, salmonberry, currant and/or devil's club occur in narrow bands or in larger patches in the more active alluvial sites. Root systems of these species can tap the water table, and therefore are classified as riparian vegetation.

Lakes

Riparian areas that contain lakes as their aquatic ecosystem are either situated in topographic depressions or are a dammed stream or river channel. Dams may be human-made hydroelectric or water source dams, or may be natural dams such as those made by beavers.

The aquatic ecosystem is bounded by either an upland non-riparian ecosystem or wetland vegetation community. Wetland riparian ecosystems can almost always be found where a stream or river enters a lake.

PRESENT CONDITION

Existing pristine riparian areas on the Forest are in very good condition. They support, for the most part, old-growth riparian habitat and associated dependent species. Riparian ecosystems that have been cut for timber are now in various states of relatively rapid secondary plant succession. Roads constructed on riparian ecosystems have converted these sites into a non-productive status. Except where highly disturbed, the tree cover on these secondary successional riparian areas is very similar in composition to the original riparian ecosystems. The more highly disturbed the site, the more the secondary succession will represent original primary successional process. Secondary successional riparian ecosystems may or may not provide the same riparian area wildlife and vegetative species before and after timber harvest and road construction. They do, however, supply changing habitat types and species composition. If natural succession processes are allowed to continue, these secondary successional riparian ecosystems will eventually return to their pre-management activity ecosystem stage. The only condition where this will not occur is where roads have been constructed. Here, the riparian ecosystem is removed from productivity.

An increased emphasis on the aquatic ecosystem and fish management started in the early 1970's. In 1976, standards and guides for protection of soils, water, and fisheries were initiated in the Southeast Alaska Area Guide. Since the implementation of the Tongass Land Management Plan in 1979, the goal on the Forest has been to protect and/or enhance fish resources and their habitats. More protection measures for riparian areas have been imposed on land activities, especially timber management. This additional protection during timber cutting places emphasis on leaving vegetation to protect the streams from detrimental water temperature increases or sedimentation from stream bank erosion. Vegetation left along streambanks could also provide large woody debris for stream systems. Shortly after 1979, the Fish Habitat Management Unit (FHMU) concept changed to include not only fish, but certain dependent wildlife species, and recreational opportunities, and the name changed to Aquatic Habitat Management Units (AHMU). This management philosophy is presently being applied

on the Forest. The AHMU term will be used throughout the remainder of this section, in place of the FHMU.

An AHMU, as identified in the Alaska Regional Guide, is that portion of land, including the stream channel and the streambanks, defined for the protection of stream habitat and maintenance of stream productivity. Special considerations are also given to the area at least 100 feet on either side of the stream. In short, AHMU's are management units established to manage the riparian area and dependent resources, but also encompass terrestrial uplands. How much of the terrestrial upland area is included in the AHMU's varies across the Forest depending on the standards and guidelines developed for each project. Direction in the Alaska Regional Guide Final Environmental Impact Statement (FEIS) is that timber management practices and other land use activities within AHMU's are to be prescribed to the degree necessary to meet management goals for fish habitat. Special logging methods, streamside strips of uncut timber, cutting unit layout, and other appropriate approaches are used as viable options to protect fish habitat and manage for the AHMU.

Streams and rivers have been described and identified, and placed into three value classes. These classes reflect the existing or potential importance of the stream segment with reference to 1) flow characteristics, 2) present and foreseeable downstream values of water, and 3) physical characteristics of the stream environment. Channel typing is the classifying of physical characteristics of stream and river channels, and lake shores and beds. Channel typing is complete on the Forest, and will be used for planning, implementing, and monitoring forest management activities relating to the aquatic ecosystem. Stream classes and channel types are discussed in the fish section of this chapter.

Several wildlife species depend upon the riparian area for their existence. Riparian ecosystems along lakes and streams and those of associated wetlands--especially estuarine and certain muskegs--are very important. Wildlife dependent upon the riparian area, and the riparian habitat requirements of each dependent species, are discussed in the wildlife section of this chapter.

POTENTIAL

The potential to increase resource outputs from riparian areas is limited by the degree to which resource outputs are linked together. While the yield from any one of the resources could be increased over present levels, the reduction of other dependent resources mau occur, and the adverse impacts on the riparian area, and on water quality, could exceed minimum legal standards. Close coordination in managing all riparian-dependent resources is necessary to the proper management of each one.

DEMAND ASSESSMENT

Demands upon riparian areas will be related to watershed conditions, fisheries needs, wildlife needs, recreation use, and timber production. Past riparian demands have been related to timber harvest. Today, there is an increasing demand for management of the riparian areas for the other riparian-dependent resources. Riparian areas will become increasingly important to the protection and management of the aquatic ecosystems, especially in heavily timber-harvested watersheds. An increase in forest recreation use will increase the demand for aesthetically pleasing riparian areas used for camping and water-related recreation.

EXISTING DIRECTION

The Tongass Land Management Plan Final Environmental Impact Statement (FEIS) addresses only certain specific riparian areas, such as estuaries and wetlands, with its emphasis being on estuaries. The Tongass Land Management Plan FEIS states that "management activities under the Proposed Action that are located in or adjacent to floodplains or wetlands are to conform to the directives of Executive Order 11988 and 11990." It also directs compliance with the policies set forth in the Southeast Alaska Area Guide for water, fish, estuary, and wetland resources to minimize any potential adverse effects. Goals in the Alaska Regional Guide, essentially the same as those in the Southeast Alaska Area Guide, are as follows:

1. Meet the management goal for fish and fish habitat, and for wildlife and wildlife habitat.
2. Meet or exceed Federal and State water quality standards.
3. Protect aesthetic and recreational values and uses.
4. Provide for greater fish and wildlife populations through a substantial increase in habitat management, including, but not limited to, projects such as pothole development, fish passage construction, stream clearing and similar activities.

Policies from the Forest Plan and Alaska Regional Guide include: directing full cooperation with the State and other federal agencies in estuary and wetland related activities; inventorying important estuaries and wetlands at the allocation level; employing the interdisciplinary process during all phases of the planning process to ensure the management goals for estuaries and wetlands will be met; prescribing development measures, distance, and timing of unavoidable activities within or adjacent of estuaries and wetlands; prescribing selection criteria to assist in the process for selecting log transfer and storage sites; and phasing out log transfer and storage sites that do not comply with policies in the Guide.

RESULTS OF TLMP IMPLEMENTATION

Implementation of TLMP has resulted in an overall emphasis on riparian area management, such as by using aquatic and wildlife habitat management units (AHMU and WHMU). Vegetative buffers have been applied and designed along streams to protect riparian areas. Emphasis on riparian areas has increased throughout the planning period. Standards and guidelines as presented above are being applied in project planning and initiation.

OPPORTUNITIES

From the management perspective, riparian concerns revolve around using the productive capabilities of riparian areas while minimizing resource conflicts and potential adverse impacts. As demands increase for outputs of all key resources found in riparian areas, conflicts between uses may intensify and become more difficult to resolve.

Management opportunities include the recovery of riparian areas from past activities, and placing more constraints on present and future activities within them. Through forest planning, the development of well-defined management units in the remaining riparian areas can be accomplished. Research and resource inventory data provide the opportunity to define the actual riparian situation on the Forest. Through the application of Forest Standards and Guidelines, including establishment of riparian management areas and improvement techniques, the restoration of riparian areas altered by human activities can be accomplished. This will also assure continued productivity of remaining riparian areas.

SUBSISTENCE

OVERVIEW
DEFINITION

Subsistence is defined many different ways by many different people. To some, it is a means of supplementing one's food supply, or an opportunity to harvest natural resources. For others, it is a means of survival. And for many, it is a way of life, a means of fulfilling physical, spiritual, social and cultural needs. Harvesting of resources for personal use is just one aspect of a subsistence lifestyle. Sharing resources with others, gathering, preparation, and community interaction are of special cultural, social, and traditional significance. Subsistence users are often tied to specific land areas.

To provide a single definition of subsistence which can convey all views is difficult. While many different meanings of subsistence exist, a legal definition is provided in Section VIII of the Alaska National Interest Lands Conservation Act (ANILCA) (P.L. 96-487). ANILCA, Section 803, defines **"subsistence use" as "the customary and traditional uses by rural Alaska residents of wild renewable resources for direct, personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."**

Unlike modern economic systems which rely on trade, manufacturing, and finance for their livelihoods, subsistence economies are dependent directly upon fish and wildlife resources; and are tied to tradition, culture and interactions within the family unit or clans. The social and cultural values of a subsistence lifestyle are often more important to the subsistence user than the economic gain. Subsistence is a way of life which provides, for many, a means of retaining cultural and social values, and of visibly expressing those values during times of development and change.

The significance of the cultural and social aspects of subsistence are recognized in law. Section 801 of ANILCA states "the continuation of the opportunity for subsistence uses by rural residents of Alaska, including both Natives and non-Natives, on the public lands and by Alaska Natives on Native lands is essential to Native physical, economic, traditional, and cultural existence, and to non-Native physical, economic, traditional, and social existence;"

The ability to maintain a subsistence lifestyle depends, in part, on responsible management of the land and resources. A sustainable, accessible supply of natural resources must be provided for, and the needs and personal values of those engaged in a subsistence way of life must be considered when making land use decisions. Consistent with federal law and the purposes for the establishment and management of the National Forests, the Forest Service will provide for subsistence uses of natural resources on National Forest Lands in Alaska while fulfilling its commitment to multiple use management.

ROLES AND RESPONSIBILITIES

Both the State of Alaska and the Forest Service play key roles in the protection of the natural resources which provide subsistence opportunities on the Tongass National Forest. The state is responsible for managing the fish and wildlife resources of Alaska. It is the responsibility of the Forest Service to manage the fish and wildlife habitat on National Forest lands. State and Forest Service fish and wildlife responsibilities are summarized in the following paragraphs.

The state is responsible for:

1) defining which uses are traditional and customary for fish and wildlife resources.
2) defining which fish and wildlife species are subsistence species.
3) defining which communities are rural and which communities have traditional and customary uses of which species.
4) allocating fish and wildlife resources between subsistence users and non-subsistence users.
5) obtaining necessary information on subsistence resource uses to accomplish its responsibilities.

The Forest Service is responsible for:

1) management of habitat; providing habitat for fish, wildlife and other subsistence resources used on National Forest lands.
2) maintaining and managing for access opportunities.
3) evaluating all activities for their effect on subsistence uses and opportunities as mandated in Section 810 of ANILCA.
4) obtaining necessary information on subsistence resource uses to accomplish its responsibilities.

LEGISLATIVE HISTORY

In February 1980, Congress enacted the Alaska National Interest Lands Conservation Act (ANILCA) (P.L. 96-487) to provide for the designation and conservation of certain public lands in the State of Alaska. Subsistence management and use is addressed in Title VIII of ANILCA. Federal policy directs that "consistent with sound management principles, and the conservation of healthy populations of fish and wildlife, the utilization of the public lands in Alaska is to cause the least adverse impact possible on rural residents who depend upon subsistence uses of the resources of such lands;" (16 U.S.C. 3112).

Prior to the passage of ANILCA, the Alaska State legislature enacted a state subsistence law in 1978. Four things were accomplished under this law: 1) it defined "subsistence uses" as "the customary and traditional uses" of fish and game for food clothing, trade and other specified purposes, 2) it required that the State Boards of Fisheries and Game authorize subsistence hunting and fishing, unless sustained yield would be threatened, 3) it required that in cases of relative resource shortage, subsistence uses would have priority over other uses, 4) it required that the Boards determine who should be authorized to harvest based on: dependence, local residency, and available alternatives in situations where only subsistence uses could be authorized and not all those eligible for subsistence could be allowed to hunt and fish.

The Boards of Fisheries and Game adopted a joint procedural regulation interpreting the subsistence law. The regulation limited subsistence uses to "customary and traditional" uses by "rural" Alaska residents, it listed eight criteria the Boards would use to identify subsistence uses of a community or area, and it clarified that the Boards would provide a reasonable opportunity for subsistence, unless the resource would be jeopardized. The regulation also clarified that subsistence uses could not be cut back until all other uses were first cut back, and, if necessary, eliminated. Subsistence uses would be the last to go in times of limited resources.

Two court cases, Madison v. Alaska Department of Fish and Game and State of Alaska v. Eluska, challenged the boards' interpretation of the state law, and changed the way in which the Boards of Fisheries and Game regulated subsistence. In the 1985 Madison decision, the Alaska Supreme Court ruled that the state legislature in

passing the 1978 subsistence law, had not intended that subsistence be limited to "rural" customary and traditional uses and did not mean for it to be authorized on a community or area basis. The Eluska case, also decided in 1985, determined that subsistence could not be accommodated through general hunting regulations, and required that separate subsistence regulations be established. After these two decisions were made, it was further determined by the Department of the Interior that Alaska's subsistence law was no longer in compliance with the requirements of Title VIII of ANILCA. If the State program were not brought back in compliance by June 1, 1986, the Department of the Interior would assume responsibility of administering subsistence use on public lands (Alaska Native Law Section, 1989 Subsistence Update).

While the federal government believed that the state would come into compliance with federal law by the June 1 deadline, a Federal Subsistence Resource Management Program and Board were created in the event that the state failed to comply. The board consisted of top federal officials of the Bureau of Land Management, National Park Service, Bureau of Indian Affairs, USDA Forest Service, and the U.S. Fish and Wildlife Service. The draft policy developed by the board used the policy of the State Boards of Fisheries and Game as its framework, but modifications were made to make it consistent with federal laws and programs.

The State successfully met the June 1 deadline, thus retaining its responsibility for the management of subsistence resources on Federal lands in the state. Under the new subsistence law two new clarifications were presented: first, "subsistence uses" were redefined as the "noncommercial, customary and traditional uses of wild renewable resources by a resident domiciled in a rural area of the state". Second the new subsistence law established how subsistence uses would be identified and regulated. These changes resolved the conflicts addressed in the Madison and Eluska cases. The law enabled the state to retain responsibility for the management of the fish and wildlife resources on state and federal lands (Alaska Native Law Section, 1989 Subsistence Update).

On July 15, 1986 the Kenaitze Indian Tribe of the Kenai Peninsula Area (Kenaitze Indian Tribe v. State of Alaska, 860 F.2d 312 (9th Cir. 1988)), alleged that the State of Alaska's definition of "rural area" in its 1986 subsistence law was inconsistent with the meaning of the term "rural" in the Title VIII of ANILCA. The State's definition of "rural" extends the priority only to those who live in "a community or area of the state in which the noncommercial, customary, and traditional use of fish or game for personal or family consumption is principal characteristic of the economy of the community or area." The Kenaitze Tribe claimed that the term "rural" had to be given its ordinary meaning, that of a geographic area with a small population, and that it could not be defined so as to restrict the priority to only those who live in an area where subsistence activities are a principal component of the economy. It was the Kenaitze Tribe's position that the tribal members living on the Kenai Peninsula are rural residents and their customary and traditional harvests of fish and game for subsistence uses are entitled to preference over competing non-subsistence uses (Alaska Native Law Section, 1989 Subsistence Update).

On July 9, 1987, the courts found that the State's definition of "rural area" was not inconsistent with Section 804 of ANILCA which was later reversed on October 24, 1988 by the Court of Appeals. The Court of Appeals concluded that it owed no deference to the interpretation adopted by the Department of the Interior or the State of Alaska. Interpreting the statute's meaning, it found that Congress used the term "rural" in its plain and ordinary sense to refer to areas of Alaska that

are "sparsely populated". It noted that adopting the State's "contorted definition" of rural would "materially change the sweep of the statute... and lead to an inconsistency within the statute." The court noted that giving the term rural its conventional meaning avoided an internal inconsistency and concluded that the State's definition of rural was inconsistent with ANILCA. The State of Alaska was once again out of compliance with ANILCA and given the option of amending its laws or advising the Department of Interior that it was withdrawing from its role in administering ANILCA (Alaska Native Law Section, 1989 Subsistence Update).

Recent court decisions regarding subsistence have directly affected public lands managed by the USDA Forest Service. In Tenakee Springs v. Courtright, plaintiffs sought a declaratory judgement that the 1981-86 Alaska Pulp Company Operating Plan was inadequate for all activities included in the plan, and also sought the forbiddance of a specific road project in the Game Creek area of Chichagof Island. The plaintiffs felt that the construction of the road would adversely affect subsistence opportunities in the Tenakee Springs area (Alaska Native Law Section, 1989 Subsistence Update).

The District Court of Alaska declared the 1981-86 Operating Plan EIS inadequate as to all activities in the Record of Decision (ROD). The two most significant reasons were: 1) the deletion or deferral from harvest a substantial number of harvest units originally included in the Record of Decision; and 2) inadequate discussion of the "no-action" alternative for each area entered, particularly in light of the substantial alteration of the original plan. With respect to the road project in Game Creek, the court held the EIS was inadequate because of lack of site-specific detail correlating alternate road and harvest configurations with environmental factors such as fish and wildlife resources, and the lack of discussion regarding cumulative impacts (Alaska Native Law Section, 1989 Subsistence Update).

A settlement agreement was approved by the court which precluded further appeal of these decisions and held the Kadashan and Game Creek lawsuits in abeyance until the completion of a supplement to the 1981-86 and 1986-90 APC Operating Plan FEIS's (R10, Timber Management, October 20, 1989).

In the case of Hanlon v. Barton, residents of Hoonah, Alaska challenged that the Alaska Pulp Company 1986-90 Operating Plan EIS was inadequate under NEPA and ANILCA section 810. This section regards the effects of the plan on subsistence resources. The residents sought an injunction halting all timber harvest and related activities in the Hoonah area. They argued that subsistence analysis in the EIS was inadequate because it failed to consider the effects of unplanned, but foreseeable future activities on subsistence resources. A decision was issued in November 1988. The court found some deficiencies under NEPA in the treatment of "carryover" 1981-86 timber and the "no action" alternative. The court otherwise held that the 1986-90 EIS was adequately site-specific and denied the plaintiffs motion for preliminary injunction because of their failure to show immediate harm. This was weighed with the harm which would occur to those dependent on the timber industry if an injunction were granted. A settlement agreement reached between the plaintiffs and the Forest Service defers harvest of some units in sensitive areas while allowing the majority of the activities to go forward, pending completion of the Supplemental Environmental Impact Statement for the APC Operating 1981-1990 Plans (Alaska Native Law Section, 1989 Subsistence Update).

SUBSISTENCE-RELATED ISSUES

EFFECTS OF TIMBER HARVEST ON SUBSISTENCE

The logging of high-volume, old-growth timber stands in Southeast Alaska forests and its potential impacts on biological and socioeconomic elements is a controversial issue. A primary issue surrounding the cutting of old-growth forests is the effect on habitat of the Sitka black-tailed deer. Old-growth forests sometimes represent key winter foraging habitat for the deer as canopy of trees provides protection during heavy snowfall. Clearcutting harvest techniques used in these forests in the last two decades have not adversely affected the deer, because winters have been relatively mild and much of the forest remains in an old-growth condition.

Recent harvest numbers for Sitka black-tailed deer have, in fact, been high. Figures from the Department of Fish and Game indicate that the number of deer harvested in Southeast Alaska has increased from an estimated 3,100-4,800 in 1980 to an estimated 15,000 in 1986-87. By 1987, the bag limit for Southeast varied from one to six deer, with a season of four to six months in length. Some biologists predict, however, that with the first severe winter, for which, statistically, the region is overdue, there will be a reduction in its deer population.

Fisheries habitat is also potentially affected by timber harvesting practices. Cooperative fisheries research, however, has lead to changes in the design of timber harvests in order to minimize impacts to fisheries, management techniques to enhance fish habitat productivity, and changes in various aspects of road construction. Since enactment of the Lands Act (ANILCA), the Forest Service has completed 80 fisheries enhancement projects. When fully operational, these projects could yield up to 8 million additional pounds of salmon annually to Southeast fisheries. The Southeast contribution to the State fish harvest has increased steadily from 16 percent in 1970 to 25 percent in 1986. Fish harvests have been at record levels for the past few years. The Forest Service will address the subsistence effects of timber harvesting in the Tongass Land Management Plan Revision.

A by-product of timber harvesting is the building of roads, an important agent of change in the region. These road networks provide greater access to areas previously unconnected and may affect subsistence hunting and fishing areas in both positive and negative senses. First, the road networks provide access to areas previously not or under-utilized for harvest of resources. Second, the roads provide access to areas where resource over-utilization is a potential. On Prince of Wales Island, for example, areas that have become interconnected by road networks, are now more easily reached through the Marine Highway System, thus providing greater access from Ketchikan. While road systems tend to bring more people into an area, they also serve to give subsistence hunters access to previously remote regions and provide a greater dispersion of hunters for subsistence harvests.

The Southeast Regional Fish and Game Council in November 1985 performed an informal public opinion on the effects of timber harvest in Southeast Alaska. Roads were an issue raised in the responses to the poll. Of the 400 responses from 33 Southeast towns, 147 respondents who felt that timber harvest and related activities have a positive effect on their subsistence harvesting. For 96 people, roads were the main major benefit due to them opening up new areas to hunting and fishing. Seventy-six of the respondents felt that clearcuts improve hunting and berrying; although many said that it was only until the brush got too high. The negative side of the roads issue was expressed by 51 people who consider the

increased road accessibility to be putting too much pressure on existing game populations (News Release, SE Regional Fish and Game Council, November 25, 1985).

Native corporation logging is a developing subsistence problem. When Native corporations selected lands from the National Forests in Southeast, many selected prime timber sites near Native villages. These prime sites, the bottomlands along rivers, tidal estuaries, and coastal fringes are also key areas for wildlife habitat. Combining the close access to the villages with that of being key wildlife and fisheries habitat has severely restricted subsistence uses within close proximities to the communities.

The Southeast Regional Fish and Game Council submitted it annual report to the Secretary of Interior as called for in ANILCA, Section 805. One of the prime concerns of this organization listed the effects of timber harvest on habitat availability as a key concern:

> As was indicated to you in our previous report, the Southeast Regional Fish and Game Council has serious concerns with regard to the maintenance of adequate habitat for the long-term viability of our fish and game resources. We have continued to express our concerns in a number of forums, especially through many of the public processes provided by the dominant land manager in Southeast Alaska, the United States Forest Service (USFS). To date these efforts have met with mixed results. While we have established better contacts with the USFS, we have as of yet failed in our efforts to get this agency to seriously look at fish and game issues with the long-term vision that is essential to assuring that adequate habitat and resources will be available for many, many generations to come. We are going to continue our efforts to see that the USFS properly identify the cumulative effects of its land management policies, and will be seeking federal administrative and legislative help in that regard (November 25, 1985, to: Honorable Donald Hodel, from: SE Regional Fish and Game Council).

FISHERIES

Fish, especially salmon, are probably the most important subsistence resource in the State. These fisheries resources are assets which, if nurtured and managed carefully, will continue to thrive each year and provide opportunities for subsistence, personal use, commercial, and recreational uses. Fishery stocks are not only State resources, but also cross national boundaries and have international implications. The majority of fish produced in Southeast Alaska originate on lands managed by the Forest Service in the Tongass National Forest. Management of the habitat is the responsibility of the Forest Service while management of the escapement levels is the responsibility of the State of Alaska.

The Alaskan fisheries resource is one of the State's most important renewable resources. The seafood industry's ability to sustain and meet a growing consumer demand illustrates the State's responsibility to continue investing heavily in maintaining and enhancing this valuable asset. There is overwhelming public agreement that the fishery resources of Alaska must be protected. However, various interest groups believe that some users would define levels of protection which conflict with the legitimate interests of others. Many developers, such as oil and logging companies, believe that development can take place without hurting fish populations, in contrast to impacts projected by commercial, sport and subsistence fishermen. In addition, the three types of user groups often disagree over the best way to manage and allocate the resource.

The following issues are part of the the fisheries conflicts which plague the resource today:

- -Commercial, sport and subsistence harvest policies
- -High seas interception of Alaskan fish stocks
- -Introduction of fish hatcheries
- -Introduction of Mariculture into the Southeast Region
- -Timber harvest impacts on fisheries
- -Mining related impacts on the fisheries resources

WILDERNESS

On Federal lands, natural areas designated as wilderness under the 1964 Wilderness Act (PL 88-577) are undeveloped and roadless areas managed to preserve their natural condition. Rural residents can continue to pursue subsistence hunting, trapping, fishing and gathering on these lands. These activities are permitted by mandates of Congress or through regulations set forth by administering agencies in their individual management plans.

Subsistence users have a variety of concerns regarding wilderness designation on public lands. Among the concerns are their ability to continue subsistence activities, including access to subsistence lands. Other issues are the maintenance of fish and wildlife populations, law enforcement, potential commercial operations, attraction of non-local users, and preservation of cultural and historical resources. Users have questions about management policies with regard to guiding, outfitting, use of mechanized equipment and vehicles, cabin construction, temporary facilities, trapping, and tree cutting.

A significant concern to residents of Southeast Alaska is the discontinued use of the natural resources in the Glacier Bay National Park. Glacier Bay, a traditional use area of the people of Hoonah, has recently been under fire by Sealaska and the Native leaders of Hoonah because most traditional subsistence uses of the Bay have been curtailed. The Department of Interior, National Park Service stated in a October 30, 1989 letter to Robert Loescher, Executive Vice President for Sealaska Corporation:

> ...Subsistence activities were not allowed within Glacier Bay National Monument prior to ANILCA pursuant to federal legislation. Therefore, as indicated by Section 815 of ANILCA, subsistence uses, including the taking of fish, are not allowed in the park. However, NPS regulations prohibiting the taking of any fish and/or wildlife within the boundaries of the park were never promulgated. Therefore, it is our intent to proceed with rulemaking that would establish the regulation pursuant to the clear language of ANILCA..."

LAND OWNERSHIP

As a result of land transfers of former National Forest Lands to the State and to village and regional Native corporations, there is question of future access into National Forest lands for subsistence purposes. For example, although residents of Hoonah can still access subsistence areas by water, which was the traditional method, they must now travel many miles by road to reach the National Forest where subsistence opportunity exists. Not only has access been limited but also the private lands between the community of Hoonah and the National Forest have been harvested, making habitat for wintering game virtually nonexistent.

Although the State owns the tidelands, private companies and individuals are increasingly applying for permits to start mariculture sites for oysters, clams, and mussels. There is concern among subsistence users that these will limit

subsistence access to hunting and fishing areas on either side of the sites. Once a site is claimed, subsistence users may tend to avoid the area, even though permits only cover the tidelands. As fish aquaculture develops, many key sites or bays could face competition from a variety of users, although to some, the small, family-type operations would epitomize the subsistence way of life.

NATIVE V. RURAL

Two issues are raised in the discussion of Native versus rural. First the Native communities of Southeast feel that the subsistence laws governing the subsistence use of resources should be further defined as to limit subsistence use during severe resource shortages to Natives only. Due to the cultural and spiritual tie and the historical and traditional uses of the resources that have been displayed by Native Americans, Native leaders in Southeast believe they have priority use of the resources.

The second and, at present, the most pressing issue facing Alaska as-a-whole is the States' definition and use of the "rural" component of its subsistence law. In a recent court decision, Kenaitze Indian Tribe v. State of Alaska, the court again found the State out of compliance with ANILCA due to the "contorted definition" of rural. In order for the State to maintain its administrative control over subsistence, it must again try and amend its subsistence law to meet the intent of ANILCA.

NATIVE CLAN BOUNDARIES

Southeast Alaska Natives at one time managed the harvest of resources on the lands themselves by the use of clan boundaries. Clan boundaries were unmapped but well understood designations where-by harvest activities within the confines were limited to specific individuals associated with similar clans. For harvest to take place by members of other clans, permission from the managing clan was necessary. This method of management kept competition levels down for the resources and enabled the managing clans first rights to whatever resources that existed in the lands designated as their use area.

Over time, with the population increase and community establishments in Southeast Alaska, clan boundaries were only understood by the Native cultures. Being unmapped, and only recorded by verbal transfer from one individual to the next, new settlers to Southeast were unaware of the significance of the clan boundary lines. New settlers, having the same need for subsistence resources as those individuals residing in Southeast, used whatever lands needed to seek out the resources that meant continuance of life. Competition for resources around permanent settlements rose dramatically.

Today in Southeast, game management by the State of Alaska, does not recognize the clan boundaries established by the Native people prior to Statehood. Although not recognized, through research of subsistence studies, the importance of clan boundaries to native people still exists and is practiced by some communities. Clan boundaries have been mentioned in the scoping of the Revision as one of the cultural ties to the lands. Native leaders have expressed the need to recognize the importance of these boundaries in regards to the overall concepts of subsistence use on the Tongass. Land allocations must keep clan boundaries in mind in order to make resources available for all Native communities. If all the subsistence resources of a clan are prescribed for other uses, then the clan impacted by the decision is forced to leave its traditional use area and venture into other lands. Through time, the significance to the original use area is lost, further eroding the significance of the clan and Native beliefs.

RESULTS OF TLMP IMPLEMENTATION SUPPLY EXISTING

The following discussion on supply of subsistence resources will be limited to that of fisheries and wildlife population trends found in Southeast Alaska. The Revision recognizes the importance of gathering of other resources (i.e., berries, spruce roots, seaweed, herring roe, bird eggs, etc.) and will discuss in the DEIS as well as FEIS. Documentation on these resources in terms of quantities and trends is limited. Through scoping, identification of areas for some of these resources uses has been very limited making the discussion of the activity difficult on a forest as-a-whole basis. The IDT will further analyze these activities to formulate a method for analysis.

The source of the following information is from the report "Subsistence Management and Use: Implementation of Title VIII of ANILCA. This report was presented in compliance with Section 813 of ANILCA, 16 USC 3123. The law provides that the Secretary of the Interior, in consultation with the Secretary of Agriculture, periodically shall prepare and submit a report to the President of the Senate and the Speaker of the House of Representatives on the implementation of Title VIII of the Lands Act. The first such report was issued in 1985, and is considered the baseline document. Subsequent reports will be issued every three years. The report which supplies the following information was presented in June 30, 1987.

The U.S. Fish and Wildlife Service produced this comprehensive document in consultation with other Federal land managing agencies in Alaska including the U.S. Forest Service (Region 10) and the Alaska Department of Fish and Game. The report provides an overview of subsistence management and use in Alaska based on the initial 1985 report, consultations with various public agency personnel, and information from existing literature and studies.

Section 813 of the Lands Act provides that an opportunity for public comment be given prior to completion of the final report to Congress. A draft of the report was distributed to the public for comment.

An historic perspective of Alaska's subsistence fish and wildlife populations along with regional discussions, was given in the Section 813 Report published in March 1985.

The material presented here gives updated population and status information on specific fish and wildlife populations used for subsistence in the State. Emphasis is on those populations that are of special concern. Populations covered include deer, moose, mountain goats, black and brown bear, waterfowl, seabirds, furbearers, and small game. The fisheries section discusses salmon populations and gives special emphasis to adversely impacted populations in a separate section entitled "Specific Fishery Problems."

STATUS OF WILDLIFE POPULATIONS Deer

Sitka black-tailed deer are found in the coastal forests of Southeast Alaska, the Gulf Coast, and Kodiak Island. In these areas, it is the major big game species, particularly for resident hunters. In 1986-87, deer populations were increasing in all units. Deer populations remain high in Unit 4 (Admiralty, Baranof, and Chichagof Islands) and unit 8 (Kodiak Island), with Unit 6 (Prince William Sound) showing high or higher numbers than in 1986 and low to moderate elsewhere.

The estimated statewide harvest of deer in 1986 was approximately 28,000. As usual, heaviest harvests were obtained in Units 4 and 8, with estimated harvests

at 10,396 and 10,000 respectively. The Unit 6 harvest may have exceeded 3,000 in 1986.

Table 3-114, Sitka Black-tailed Deer, Status, Trends, and Harvests in Alaska, 1986-1987 gives a summary of deer population status, trends and harvest levels for not only the harvest units found in Southeast Alaska, but also for the remainder of the State where huntable populations of deer exist.

TABLE 3-114

SITKA BLACK-TAILED DEER, STATUS, TRENDS AND HARVEST IN ALASKA, 1986-87

Unit	Status	Trends	Estimated Harvest
1A	Low	Increasing	779
1B	Low	Slight Increase	39
1C	Moderate	Increasing	527
2	Low to Mod	Increasing	3,151
3	Low	Increasing	166
4	High	Stable	10,396
6	Mod to High	Increasing	3,000
8	High	Stable to Increasing	10,000

Source: Alaska Department of Fish and Game

Moose

The status of moose populations in the State is highly variable. While the interior regions of the State fluctuate considerably, the isolated areas of Southeast Alaska tend to be more stable to increasing. The Department of Fish and Game estimated the range of moose population in the State to be from 144,000 to 166,000. Moose is not a principle source of meat in Southeast due to its limited range in the region. Where moose are located (e.g., Yakutat Forelands, Haines/Skagway, Berner's Bay, Thomas Bay and Farragut Bay) local residents utilize the resource for much of their subsistence resource intake. **Table 3-115, Moose Population Status and Trends in Southeast Alaska, 1987** depict the relative herds in that portion of the State.

TABLE 3-115
MOOSE POPULATION, STATUS AND TRENDS IN SOUTHEAST ALASKA, 1987

Unit	Geographic Location	Status/Trend	Comments
1A	Southeast-Region 1	Low/Stable	
1B	Southeast-Region 1	Moderate/Stable	Recent mild winter has helped
1C	Southeast-Region 1	High/possibly increasing	Excellent calf production
1D	Haines/Skagway	Stable	Low calf production
5A	Yakutat Forelands	High/increasing	Highest counts since since early '70's
5B	Malispina/Gulf Area	High/possibly increasing	No recent counts

Source: Alaska Department of Fish and Game.

Mountain Goat

Mountain goat populations in Alaska were generally stable or increasing throughout their range in 1987. Localized situations exist where harvest concentrations have affected populations, and management concerns are directed toward these problem areas.

Harvest by hunters was generally reduced in Southeastern Alaska due to adverse weather. Harvests in Gulf Coast areas and Kodiak were relatively high. The greatest harvests were achieved on the Kenai Peninsula. Statewide harvest was 586 goats. **Table 3-116, Mountain Goat Status and Trends in Southeast Alaska** shows the status and trends of mountain goat population in 1986.

TABLE 3-116
MOUNTAIN GOAT STATUS AND TRENDS IN SOUTHEAST ALASKA, 1986

Unit	Geographic Location	Status/Trend	Comments
1A	Southern SE Mainland	Mod High/increasing	
1B	SE Mainland	Mod High/increasing	
1C	SE Mainland	Mod/increasing	
1D	Haines-Skagway	Mod High/stable	
4	Baranof Island	Mod/steady increase	
5	Yakutat	Mod/stable	
6A	Katálla to Icy Bay	Mod/decreasing	Decreases primarily due to predation

Source: Alaska Department of Fish and Game

Black Bear

Black bears are widely distributed throughout Alaska. Populations appear healthy in all areas, are generally lightly hunted relative to population number, and are thought to be stable or increasing in all areas.

Hunter harvest is monitored only in those units in which sealing of hides and skulls is required (Units 1-7, 11-16, and 20). (Sealing refers to the presentation of the carcass to ADF&G so that they can take measurements, determine sex the number of kills in specified areas. The actual sealing refers to a tag or stamp placed on ears, skin, or horns identifying that the carcass has been checked.) The take of black bears by hunters increased sharply in most units in 1986 for a total harvest of 1,566 bears. The reasons for this are attributed to the increasing popularity of this species as a game animal and the relaxation of regulatory restrictions on the use of bait in black bear hunting. In all cases, however, data derived from sealing documents (e.g., sex of the bear harvested, skull size) indicate that the harvest rate is still conservative. A summary of harvest numbers, population status, and population trend in listed in **Table 3-117, Black Bear Harvest, Status, and Trends in Southeast Alaska, 1986-1987**.

TABLE 3-117
BLACK BEAR HARVEST, STATUS, AND TRENDS IN SOUTHEAST ALASKA, 1986-1987

Unit	Harvest	Status	Trend
1	222	High	Stable
2	158	High	Stable
3	137	High	Stable
5	24	High	Stable
6	260	High	Stable

Source: Alaska Department of Fish and Game

Brown Bear

Brown bear populations statewide continue at high levels. While population density data are difficult to obtain with this species and are often educated guesses, populations generally appear healthy and abundant. Problems associated with overharvesting occur only in a few localized situations.

Brown bear harvests continued to be relatively high during the 1986-87 season. Record harvests were taken in units 8, 9, and 13. Mortality of bears due to defense of life or property situations continues to increase and in some units is becoming a significant source of bear mortality. Due to the continuing problem of noncompliance with reporting and sealing requirements, mortality data for bears in remote areas greatly underestimates true mortality. **Table 3-118, Brown Bear Harvest, Status, and Trends in Southeast Alaska, 1986** shows population status, trends, and harvest of brown bears.

TABLE 3-118
BROWN BEAR HARVEST, STATUS, AND TRENDS IN SOUTHEAST ALASKA, 1986

Unit	Harvest	Status	Trend
1	21	Moderate	Stable
4	96	High	Increasing
5	29	High	Stable
6	50	High	Stable

Source: Alaska Department of Fish and Game

Waterfowl

Virtually all species of waterfowl in Alaska are used for subsistence purposes. The largest subsistence harvest of waterfowl and their eggs occurs from May through June, although birds are taken throughout the summer and fall. In some areas, geese are the most prized subsistence resource. Hunting, including subsistence hunting, is among several factors that have contributed to the decline of four species of geese which inhabit the Yukon-Kuskokwim Delta.

In 1987, breeding population estimates for ducks surveyed continent-wide (excluding scoters, eiders, oldsquaws and mergansers) showed little change from 1986, but remained 12 percent below the 1955-1986 average. Numbers of ducks of the same species in Alaska were similar in 1987 to the 1986 estimates and were 11 percent below the 1977-1986 average (Conant and Roetker, 1987).

The decline in some waterfowl resources is evident from estimated survey counts. Cackling Canada geese have declined from an estimated 400,000 in the late 1960's to 26,000 in 1984, but 1986 figures indicate an increase to 51,000. Pacific white-fronted geese have fallen from 450,000 to approximately 100,000. The emperor went from 140,000 in 1964 to 42,000 in 1985, but by spring 1987 was up to 60,000. The black brant numbers have decreased from 160,000 to 120,000, but the number of nesting birds on the Yukon Delta have reportedly dropped to an estimated 25 percent of the size of the nesting population there in 1981.

While ongoing research continues to shed light on specific causes of these declines, hunters throughout the Pacific Flyway appear to bear much of the responsibility.

Seabirds

At least 65 species of seabirds migrate or breed along Alaska's coastline and adjacent marine waters. Millions of breeding and non-breeding populations inhabit hundreds of colonies as they pass through the area. The endangered short-tailed albatross has even been viewed offshore in the summer. The Aleutians, Pribilofs, Semidis, Kodiak and Southeast Island chain, support seabirds of greater variety and abundance than any other location of comparable area in North America.

Accurate population information is lacking in many areas and trends are difficult to identify. There are ongoing efforts to develop new methods for census and research activities on the principal subsistence species, especially in the Pribilof Islands. The success of seabird populations seems to be dependent on the proximity of nesting grounds and the location of preferred food sources.

Furbearer

In Alaska, 20 species of mammals are classified as furbearers by the Board of Game, however, only 13 of these are normally harvested and enter the fur trade. No harvest information is gathered for the Arctic ground squirrel, flying squirrel, Alaskan and hoary marmot, least weasel, or raccoon. The sea otter, which is also classified as a furbearer, is protected under the Marine Mammal Protection Act and is not open to general hunting or trapping.

Statewide, beaver populations have remained high in most areas, and the species continues to expand its range in western Alaska. Although a few trappers believe marten are less abundant, the harvest statewide has remained high. Other populations seem to be stable in most areas. No marked changes appear to be occurring in the remaining species.

Estimates of Alaska's annual statewide furbearer harvests are derived from three sources: furbearer sealing certificates, fur export reports and reports of acquisition of furs. Since furs kept for personal use often are not reported,

actual harvests probably exceed those estimated from these data sources. Of the three sources, pelt sealing gives the most accurate and complete information. However, only five species in the State are required to be sealed: the beaver, lynx, otter, wolf, and wolverine. In remote, rural communities where sealing offices do no exist, harvest data is unknown. Also, rural people commonly use beaver, wolf and wolverine for their clothing and do not have the pelts sealed. Sufficient data is available to indicate that wolverine and lynx populations are of special concern.

Small Game Populations

Grouse, ptarmigan and hare populations fluctuate considerably throughout the State. Populations are typically small and very localized. They are characterized by fluctuations in their numbers due to recurrent cycles of abundance and scarcity. A complete cycle will last anywhere from 8 to 12 years. Coastal populations seem to exhibit less drastic fluctuations than small game populations in the Interior. These fluctuations must not be confused with a depletion in the resource.

Although the percentage of small game birds in the meat harvest of subsistence users in Alaska is small, studies have shown that a large percentage of families harvest the birds. Hunting pressure, however, has little effect on fluctuations over broad geographical regions of Alaska. Moreover, the management goals of providing the maximum opportunity to participate in small game hunting are currently being met.

Small game habitat may be affected by other human activity in the State. Some habitats have been lost or altered by urbanization and agriculture. Logging activities and fires may enhance habitat for hares and grouse, while reducing it for ptarmigan.

Factors other than human activity which can cause an increase or decrease in populations are not well understood, but usually include food supply, weather, predation, disease and which mortality during cold, wet springs.

STATUS OF FISH POPULATIONS

The information in this section focuses on salmon populations. Data on fresh-water fish populations is sparse and frequently incomplete. However, these fish are acknowledged to be very important for subsistence purposes in certain areas of Alaska. This report emphasizes salmon because of statewide distribution. The Department of Fish and Game keeps detailed harvest information on salmon. This information is the best proxy available for overall population levels and is used as such.

Commercial salmon catches totaled 127.8 million fish in 1986. This is the seventh straight year that the catch has exceeded 100 million. The incidence of such high catches not only represents cautious optimism that relatively consistent catches can be expected, but that dramatic improvements are possible over the level of a dozen years ago. At that time, the annual catch averaged about 20 million fish.

In 1985 commercial fishery users logged the all-time harvest of 146.7 million fish. This was substantially greater than the previous records set during the 1930's when Alaskan waters and streams were totally unregulated.

The principal contributing factors for these increases include:

1. Favorable environmental factors, especially weather conditions and water temperatures.
2. More precise fishery and habitat management, better technology and the ability to forecast with greater accuracy.
3. Establishment of a 200-mile offshore fishing zone for foreign fishing interests. The consequential reduction of high seas take has benefited the overall Alaska fishing industry, and
4. Effort for the fisheries has increased.

Subsistence users are greatly helped by predictable and dependable fish populations from year to year. By achieving a fishery of high quality and quantity, all users have benefited.

The State of Alaska is divided up by the Department of Fish and Game, Division of Commercial Fisheries into four regional management areas. The Tongass National Forest is included in the Southeast Region. Waters of this region include those east of Cape Suckling to the Canadian border near Prince Rupert. Fishing is managed as one major unit. Pink salmon are the most abundant species, although sockeye are targeted by subsistence users. Commercial net fishermen prefer pinks and chums.

The subsistence fishery is managed through an individual permit system. Permits are required by regulation. However, there is widespread public misunderstanding of and resistance to the permit process, which has resulted in a majority of users not obtaining permits. Data regarding number of users is therefore incomplete. In 1985, over 3,500 subsistence permits were issued. Based on those permits, subsistence take was estimated at 160,700 salmon, valued at approximately $6,300,000.

Although many of the sockeye salmon systems in Southeast Alaska have had a high history of production, they are now in low supply. It is believed that overharvesting through interception by commercial fishermen prevents the salmon from reaching spawning grounds and subsistence use areas. The weak run has resulted in low permit limits for subsistence users. Accurate harvest data in most areas has been difficult to obtain due to poor compliance with the permit requirements.

Numbers of chinook salmon are currently depressed all along Southeast's coast. The major chinook spawning streams are large bodies of water with high turbidity. This prevents accurate escapement counts and makes management for maximum sustained yield impossible. In 1984, the U.S. and Canada signed the Pacific Salmon Treaty, in part, to protect chinook species.

Since much of Southeast Alaska is included within the boundaries of the Tongass National Forest, activities within the forest boundaries on both public and private lands can have both positive and negative impacts on the fisheries resources.

Allocation of the salmon fishery between commercial and subsistence fisheries is important in maintaining adequate resources for subsistence and other users. The Board of Fisheries is sometimes handicapped in its ability to make precise decisions in those areas where it lacks fish monitoring records, stock tagging data with recovery statistics, and other distribution information. Improvement of

fishery data collection and analysis methods is essential to sound management of this vast, complex fishery.

The State's Southeast Comprehensive Salmon Plan establishes salmon enhancement and rehabilitation programs. State fish hatcheries are at Beaver Falls, Crystal Lake, Deer Mountain, Hidden Falls, Klawock and Snettisham, and are expected to contribute 131,570 salmon for harvest.

POTENTIAL

The Wildlife and Fisheries sections of the Analysis of the Management Situation (AMS) depict the current and potential habitat capabilities for wildlife and fisheries. Population is not addressed due to the Forest Service having control on only the habitat of the species of fish and game listed. Depending on which management strategy is chosen for the Tongass Land Management Plan Revision, habitat capabilities will vary by alternative. Both the Wildlife and Fisheries Sections of the AMS display this range of habitat maintenance. Reference is made to these two sections for and in-depth review of the habitat capabilities for potential of populations on the lands managed by the Forest Service on the Tongass National Forest.

DEMAND
PAST

Thousands of years ago, Alaska was settled by people seeking the most abundant fish and wildlife resources. Villages and camps were established where access to these wild resources was dependable and convenient. Until relatively modern times, most of the necessities of life came from the land and its natural products, or from trade with adjacent neighbors. The rules governing life among villagers were derived from a combination of culture, tradition, and spiritual beliefs, which developed over long periods of time (Historic Methods for Harvesting Non-Commercial Salmon in Southeast Alaska, February, 1989).

The introduction of cash by Russian traders beginning in the 1700's signaled change in the subsistence way of life. Cash transactions allowed the Native Alaskans to take advantage of technology and provide a buffer against periods of low food supply. It was following World War II, and more precisely at the time of statehood around 1959, that jobs opened up and many rural Alaskans began to experience the cash economy. In 1987, almost thirty years later, many subsistence users earn wages during part of or throughout the year.

The benefits of modern technology allow rural Alaskans to live in larger, less dispersed communities, yet continue to participate in traditional subsistence activities. Changes in modes of transportation, such as motorboats and snowmobiles, have allowed greater access to subsistence resources. The Western way of life with its cash economy has had a profound influence on rural Alaskans. They have maintained their cultural identity and the importance of subsistence activities in their lives.

Though the infusion of cash is thought by some to cause a decreases in subsistence activities, in some cases it has enhanced their use due to better access and efficiency in acquiring the harvest. This integration of cash into the economy has made subsistence a complex issue to understand.

PRESENT
SUBSISTENCE USER
CHARACTERISTICS

Population Overview

Southeast Alaska has a population of slightly less than 65,000 people. Most of this population is located in 32 major communities, with Juneau and Ketchikan accounting for approximately 60 percent of the Regional total. Sitka, Petersburg, and Wrangell account for 22 percent of the Regional total. Most of the remaining 18 percent of the Regional population live in the other 27 important communities which range in size from very small communities like Elfin Cove and Meyers Chuck

to communities like Haines and Metlakatla (Overview of Non-Commercial Fish and Shellfish Harvest and Use in Thirty Southeast Alaska Communities, 1979)

In addition to permanent communities, logging and mining camps are located at sites of resource extraction and fish processing. Some of these camps have large enough populations and have existed for long enough duration that local uses of fish and wildlife may be significant. These would include logging camps at locations such as Eight Fathom Bight near Hoonah on north Chichagof Island, Cube Cove on north Admiralty Island, Hobart Bay on the mainland north of Frederick Sound, Labouchere Bay on North Prince of Wales, as well as numerous floating and land-based logging camps at other locations of the Tongass National Forest. Mining activities at Greens Creek on north Admiralty, Berner's Bay and Misty Fiords National Monument introduce sizeable numbers of people into rural areas. While in many cases information is available about the location, number of residents, and potential use of natural resources of the larger, less transient camps, no complete listing of temporary camps and their populations exists. Because camps come and go with contract timber sales and economic conditions, it is difficult to track camp populations. Camp residents appear to be split between Alaska residents who stay in the state year round and identify themselves as Alaskans and residents of other states who leave Alaska when the working season is over for the year (Overview of Non-Commercial Fish and Shellfish Harvest and Use in Thirty Southeast Alaska Communities, 1979).

A relatively small number of other Southeast residents live at remote isolated locations. These include people living at homesites throughout Southeast, at summer fishing sites along the outer coast, tree thinners camped near areas where they have Forest Service contracts, trappers, people living on float houses in the southern part of the Alexander Archipelago, and people living on fishing boats. This diverse group of itinerants generally has very low cash income and is closely tied to non-commercial harvest of fish and game.

As in other parts of Alaska, Southeast's population grew with the expansion of government services following the oil boom. In recent years, however, the population has become more stable. A number of new communities, however, are in the process of becoming established either around state land selections or timber harvesting activities. Edna Bay, Coffman Cove, North Whale Pass, Thorne Bay and other small Prince of Wales Island communities have grown up in this way. Other sites of long-term camps are starting to become permanent.

Cultural Groups

At historic contact, there were approximately 10,000 Tlingit in Southeast Alaska divided into fourteen or fifteen tribal divisions. Each tribal division had at least one principal village, and tribal members controlled the resources of the surrounding area. The Haida moved north from Queen Charlotte Islands into Southeast Alaska, intruding into Tlingit territory on southern Prince of Wales Island, possibly during the late prehistoric period, circa the 1700's. The Tsimshian moved from Metlakatla Pass into Southeast Alaska in 1887, to form the community of Metlakatla on Annette Island (Overview of Non-Commercial Fish and Shellfish Harvest and Use in Thirty Southeast Alaska Communities, 1979).

In addition to the Alaska Native cultural groups, several other cultural groups have settled in Southeast Alaska since historic contact. Major cultural groups have included Russians, Scandinavians, Filipinos, and various Euro-Americans from the continental U.S. Petersburg is one community with a substantial population tracing cultural roots to Norway. Cultural group affiliation is one factor found to be highly correlated with resource use patterns.

Of the 25,500 people living in the rural communities of Southeast Alaska, seven percent (1,572 people) live in the 17 small communities that had under 100 occupied households in the winter of 1988. Thus, about half the communities of rural Southeast Alaska account for less than 10 percent of the rural population. A third (9,000 people) of all rural residents live in the 11 communities of between 100 and 999 occupied households, and another quarter (6,875 people) live in Wrangell and Petersburg, each having approximately 1,000 households. Finally, one in three rural residents live in Sitka (Draft Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents, 1989).

Table 3-119 identifies the rural communities of Southeast Alaska. All have subsistence rights as defined by the rural designation developed by the State of Alaska. All communities with the exception of Juneau and Ketchikan are included in the rural community designation. Juneau and Ketchikan are designated as being urban developments.

TABLE 3-119
RURAL COMMUNITIES AND OCCUPIED HOUSEHOLDS OF SOUTHEAST ALASKA

Community	Number of Occupied Households
Cape Pole	8
Meyers Chuck	10
Kasaan	14
N. Whale Pass	18
Point Baker	19
Elfin Cove	19
Edna Bay	21
Port Protection	27
Hollis	32
Port Alexander	37
Hyder	39
Klukwan	39
Tenakee Springs	45
Gustavus	65
Coffman Cove	66
Saxman	76
Pelican	82
Hydaburg	110
Angoon	140
Thorne Bay	156
Yakutat	169
Kake	193
Skagway	204
Hoonah	219
Klawock	224
Craig	365
Metlakatla	418
Haines	608
Wrangell	1,013
Petersburg	1,217
Sitka	2,872
Total	8,525

Source: DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents and Demographic Background Material for 30 Southeast Alaska Communities, 1989

The median 1987 family income in rural Southeast Alaska was $37,500. This can be compared with a U.S. median family income in 1987 of $30,853 (USDC 1988). In addition to the income generated by rural residents of Southeast are the substantial public services that are subsidized through government programs or provided by Native Corporations (Draft Subsistence Use of Renewable Resources by Rural Southeast Alaska Residents, 1989).

Viewed from another perspective, however, incomes of Southeast Alaskan residents living in rural communities appear relatively low. The 1987 mean per capita income for Alaskans was $18,230 (Bureau of Economic Analysis, 1988). The comparable figure for Southeast Alaska is $12,000. The members of one in six rural Southeast households had per capita incomes of less than $5,000 in 1987. Thus the maximum income for households in this category with four members in 1987 was $20,000 (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

Viewed as a whole, Alaska is a state characterized by a highly mobile population. Much of this mobility, however, is confined to its urban centers. Rural Southeast Alaska residents are more likely than their urban counterparts to remain in a single community most of their lives. Slightly under half of all households (46 percent) have had a household member residing in the same community for 20 years or more. In only one in five households has no one resided in the community for at least five years (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

Only 15 percent of rural Southeast households harvest no subsistence food. Half of all households (51 percent) report harvesting more than 80 pounds of edible subsistence product per capita in 1987. A quarter of all households harvest more than 250 pounds per capita (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

Much of the subsistence harvest is directly incorporated into household diets. Almost one in three households get at least half of the food they eat from their own harvest activities. A total of 40 percent of all households get at least 25 percent of their food from household subsistence harvests (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents) .

Residents not only use subsistence products for much of their food they also tend to harvest multiple types of subsistence resources. More than half of all households (61 percent) harvested at least four different types of fish, wildlife and/or plant resources in 1987. One in ten households harvested more than 10 different types of resources (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

The use of subsistence resources in Southeast cannot be explained simply in terms of household harvest and consumption. Most subsistence harvesters give at least part of their harvest away. A third of all households in rural Southeast Alaska gave away at least four different types of resources in 1987. Most (approximately two-thirds) of the households reporting that gave no resources away did not harvest any resources themselves.

SUBSISTENCE USER HARVEST LEVELS

Household use of subsistence resources is high in most Southeast communities. The six communities of Edna Bay, Hoonah, Hyder, Meyers Chuck, Pelican, and Klukwan reported mean 1987 harvest of at least 400 pounds of edible subsistence product per capita. Eleven communities, Yakutat, Port Protection, Point Baker, Tenakee Springs, Elfin Cove, Port Alexander, Angoon, Gustavus, Klawock, Hydaburg, and Thorne Bay, reported mean harvests of between 250 and 400 pounds per capita. The lowest reported mean per capita harvest was in Skagway; even there the mean was 74 pounds per capita (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

The distribution of total harvest levels by community bears little resemblance to the distribution of harvest levels on a per capita basis. Sitka, which is shown to have the sixth lowest mean per capita harvest (158 pounds), represents the single largest consumer of subsistence resources. Sitka residents reported harvesting over 1.1 million pounds of edible resource product in 1987. Sitka subsistence harvests constitute 25 percent of the total harvest of rural Southeast residents. The next two largest communities, Petersburg and Wrangell, are the second and third highest consumers of subsistence resources, accounting for another 28 percent of the total regional harvest. The large differences in community size, then, account for more of the variation in total community harvest than do differences in the per capita harvest levels of individual communities (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

Households in communities of under 100 occupied residences harvested an average o 309 pounds per capita, nearly twice as much when compared to households in Sitka which harvested an average of 158 pounds per capita. Yet all 17 communities of under 100 households account for a combined total harvest of only 443,000 pounds in contrast to a total harvest in Sitka alone of 1.1 million pounds, almost three times as much (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

Eighty-five percent of all households in rural Southeast Alaska harvest at least some subsistence resources. One might think however, that the largest share of subsistence harvest would be accounted for by low income households. This expectation is consistent with the view that subsistence harvests are a means for compensating for low cash incomes. In fact, households with per capita incomes of $15,000 or more account for the highest per capita harvests of subsistence resources. And, given the number of households with higher incomes, the highest income group also accounts for a larger aggregate harvest (1,263,000 pounds) than that of the lowest income group (877,000) (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

These results show that subsistence uses of natural resources in Southeast Alaska are widely preferred sources of food. Subsistence harvest activity is therefore unlikely to diminish if household incomes are associated with increased harvests.

High income households and newcomers to communities are generally active harvesters of subsistence resources in Southeast Alaska; so are low income households and long-term residents. In keeping with this pattern of findings are the harvest patterns of Alaska Natives, whites, and persons of another ethnic background. Results of the TRUCS (Tongass Resource Use Cooperative Survey) show that the mean Native harvest per person (209 pounds), and the white mean per capita harvest (191 pounds), are similar, but that both are slightly higher than the mean per capita harvest for non-Native, non-white (148 pounds). Because

whites constitute 73 percent of the rural Southeast population, they account for the largest component (69 percent) of total subsistence harvest (3,034,000 pounds, in contrast to 1,248,000 pounds and 160,000 pounds for Natives and non-Natives, non-white households) (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

DIVERSITY OF HARVEST - In terms of usable resources provided by the natural environment, Southeast Alaska is a land of abundance. In all, the TRUCS survey indicated that forty-two different resource categories were harvested for personal use. This variety provides opportunities for diverse diets, depending on individual tastes, and preferences. The availability of subsistence resources is not uniform throughout Southeast Alaska. The uneven distribution of subsistence resources may, in part, explain variations in the diversity of harvest activity among rural Southeast Alaska communities. Edna Bay subsistence resource harvesters gather the most diverse number of resources while residents of Skagway harvest the least diverse number of resources. Geographic differences in the richness of the resource base may explain community differences both in the mean per capita harvest and percent of protein derived from such harvests. In addition to the geographic aspects of the land base, harvest regulations and other sociocultural considerations are also factors that determine levels and diversity of resource harvest (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

The diversity of resource harvest activities does not vary greatly by size of place, income, length of residence, or ethnicity. Tongass-wide, however, there is a slight tendency for households located in small communities, and households with lower income, to harvest a greater variety of resources than other households (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

RESOURCE SHARING

An important component of subsistence lifestyles involves distribution and exchange activities. The TRUCS survey identified the extent to which resources are shared between different households.

In regard to resource sharing in Southeast Alaska, a number of general patterns suggest themselves. Communities associated with higher resource harvest levels and a greater diversity of resources harvested tended to be the same communities which were associated with more extensive sharing activity, however, this did not hold true in all cases. For example, residents of Metlakatla, Saxman, Kake, and Wrangell households harvest relatively small quantities, yet they also tend to receive a relatively greater diversity of resources than households in many of the other communities which harvest a greater absolute number of pounds as well as a greater variety of resources. People living in Meyers Chuck, Point Baker, and North Whale Pass, on the other hand, tend to harvest relatively large quantities of subsistence resources, yet they tend to give away fewer different types of resources than households in other communities.

Sharing is an important cultural component of both Native and white societies. Traditionally, however, one of the special characteristics of Alaska Native cultures often mentioned is resource sharing. Tongass-wide, respondents residing in Native households gave away an average of three different kinds of resources, nearly 50 percent more than white households, which gave away an average of 2.1 resources. This contrasts with non-Native, non-white households who shared 1.7 different kinds of resources. This pattern is nearly as pronounced when data on receiving are examined. On the average, Native households reported receiving 5.3 different resources, while white and non-Native, non-white households received an

average of 3.2 and 3.7 different resources respectively (Draft Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents, 1989).

Important differences also exist in the sharing activity between households in the highest income category (who tend to share less) and other households (who both give and receive more extensively). Households containing members who average $5,000.00 annual income or less gave away a mean of 3.0 different resources, while households averaging at least $15,000.00 per person per year only gave away a mean of 1.9 resources. Households in which individual members averaged between $5,000.00 and $15,000.00 of income per year gave away an average of 2.8 resources (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

Higher income households not only gave fewer different kinds of resources to other households, but they also received fewer kinds of resources from others. Lower-income households received a mean of 5.2 different kinds of resources from other households. Higher-income households on the other hand, received only 3.3 different resources on average. Middle-income households (in which household members reported incomes ranging from $5,000.00 to $15,000.00 apiece) received 4.2 different resource types (DRAFT, Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents).

Differences in resource sharing patterns observed between lower and higher income households hold for non-Native households alone, but the pattern among Native households is somewhat different. Native households at all income levels give, on average, about the same number of different resource types (3.1, 3.7, 3.0 for low, middle, and high income groups). Interestingly, Native households receiving $5,000.00 to $15,000.00 per capita received a higher number (6.2) of different resource types on average than Native households receiving either more or less income (5.3 for under $5,000.00 per capita households and 5.0 for $15,000.00-plus per capita households) (Draft Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents, 1989).

One last noteworthy difference in sharing patterns is that long-term residents are substantially more likely to give as well as to receive subsistence resources than are people who have recently relocated to a community. Residents who have lived in a community for 30 years or more gave an average of 3.3 different resources types to other households, while people living in their community for less than 30 years gave away an average of slightly less than 2 different resources.

DEER HARVEST

Numerous studies have documented the importance of Sitka black-tailed deer as a source of food to Southeast Alaska residents. Data from the TRUCS survey further confirms the continuing importance of deer meat in Southeast Alaskan diets. Based on the survey results, deer constitute 21 percent of the total pounds of subsistence resources harvested by rural Southeast Alaskans in 1987. An estimated 11,600 deer were harvested in 1987 by 3,000 households. In other words, over one-third of all rural households in the region, approximately 37 percent, harvested at least one deer. Using a conversion factor of 80 pounds of useable meat per deer (Schroeder and Kookesh, 1988) this represents a total of approximately 928,000 pounds of deer that were either consumed, shared, or bartered by households that harvested deer.

As might be expected, deer harvest levels vary substantially by community. Residents of Edna Bay, Port Alexander, Pelican, Tenakee Springs, Hoonah, and Angoon harvested an average of at least 250 pounds of deer meat per household in

1987. People residing in these communities are located in close proximity to prime deer habitat containing healthy deer populations, and competition from outside hunters is not yet so severe that deer populations have been depleted. Further, huntable populations of deer are easily accessible, and liberal regulations have allowed relatively high harvest levels. Harvest levels were understandably lower in communities located distant from good deer habitat such as Yakutat, Hyder, Skagway, and Haines (Draft Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents, 1989).

Compared to their counterparts in some of the smaller communities, residents of the three largest rural communities in Southeast, Sitka, Petersburg, and Wrangell, harvested much lower average quantities of deer per household: 106, 150 and 59 pounds respectively. Although Sitka, Petersburg, and Wrangell residents do not harvest relatively large amounts of deer on a household basis, the three communities account for 58 percent of all deer harvested in the region, simply due to the fact that they together constitute 60 percent of the total number of rural households in Southeast. It is thus important to distinguish between differences in subsistence activity on a household and community basis (Draft Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents, 1989).

On a household basis, residents of communities with less than 100 households harvest deer in greater quantities, on the average, than the residents of larger communities. Residents of the smaller communities harvested an average of 168 pounds per household while communities larger than 100 households averaged approximately 108 pounds of deer per household (Draft Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents, 1989).

A clear difference in deer harvest quantities is also evident by per capita income. Households with lower per capita incomes have higher average deer harvests. Households whose inhabitants make $6,000.00 per resident or less harvested an average of 151 pounds of deer. Households whose residents make $6,000.00 to $14,000.00 per year each harvested an average of 125 pounds of deer. Households that contained members who earned more than $15,000.00 per year per person harvested an average of approximately one deer (80 pounds) of meat (Draft Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents, 1989).

The pattern of deer harvest activity by length of residence parallels that for subsistence harvest activity as a whole. Although the actual trend line is uneven, generally speaking, the longer that a deer hunter resides in a community, the greater is his or her tendency to harvest a higher quantity of deer. It may take newcomers to the community a few years to establish themselves in hunting social networks, to purchase the means of transportation, and to develop the social knowledge necessary to find good hunting locations. This may help explain the increase in harvest amounts between recent arrivals and the five-to-nine year resident group. The drop off in harvest levels in the 10-19 year resident group may reflect an increase in competing time demands or decreased interest (Draft Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents, 1989).

From the standpoint of ethnicity, Native households harvest about 13 percent more deer meat on the average than white households when responses are aggregated for Southeast as a whole. Native households harvested a mean of 125 pounds of deer, while white households averaged 122 pounds. Non-Native, non-white households harvested an average of 78 pounds of deer per household. On a community by community basis, however, there were notable exceptions to this pattern. In general, however, low income households that are located in communities comprised

of less than 100 households and are composed of long-term Native residents tend to harvest more deer per person than other households (Draft Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents, 1989).

Another perspective on the overall pattern of deer harvest activity can be gained by examining the total number of deer harvested by income and by ethnicity. Alaska Natives harvested an estimated 2,285 deer, or 25 percent of the total harvest. In comparison, white residents harvested an estimated 8,268 deer (72 percent of the total harvest) with the remainder harvested by persons of other races. Among rural residents, people living in Sitka accounted for a third of all deer harvested in 1987. Those living in Wrangell and Petersburg accounted for another 20 percent of the total deer harvest. Residents of the 17 smallest rural Southeast communities accounted for 9 percent of the total deer harvest (Draft Subsistence Use of Renewable Resources By Rural Southeast Alaska Residents, 1989).

FUTURE

Legal challenges, increased competition from other users of the National Forests and alternative food sources as well as transportation and jobs have prompted the Native residents of Southeast Alaska to be pro-active in the protection of the subsistence rights of Alaskan Natives. "Survival of the hunting and fishing rights is the most vital link to the survival of the State's Native people and their cultures (Byron Mallot, Southeast Conference, November 2, 1989)."

Demand for the right to subsist on the natural resources of Southeast may be more important to the Native residents of Southeast than for the amount of resources utilized. Statements made at the Southeast Conference in November 1989 lead listeners to believe that in order to maintain the Native culture of the Southeast residents, the right to utilize the land for subsistence purposes was paramount to the Native culture survival:

> Byron Mallot, Chief Executive Officer of Sealaska - "If Native people lose the right to use the natural resources of the land to maintain our spiritual and Native values we will lose it all. It will be the clearest statement that this society does not value the values of Alaska Native people. It's an issue where we must draw a line in the dust and say we are going to end here the destruction of American Indian people - it's as simple as that" (Juneau Empire, November 2, 1989).
>
> Richard Stitt, Alaska Native Brotherhood Grand Camp President - "Subsistence is a burning issue for us but I think we've been falling asleep at the switch. Our efforts to maintain what's important to us have been lacking. We have to be unified on this issue. This is our problem and we as a unit have to deal with it" (Juneau Empire, November 2, 1989).
>
> Ed Thomas, President of the Central Council - "Subsistence isn't an 'extra' right given to Native people. There is a deeper meaning to subsistence than replacing it with a T-bone steak. There is more to subsistence than the monetary value that it replaces" (Juneau Empire, November 2, 1989).

As has been seen with other cultures, the Native demand placed on subsistence resources is apparently decreasing as alternative sources of food supplies, clothing, transportation, jobs, and shelter is more readily available to the communities of Southeast Alaska. This can be seen in the Southeast Alaska Regional Health Corporation's analysis of the twenty most commonly consumed foods

by 363 Alaska Natives between 1987 and 1988. Of the twenty foods listed, only one would be constituted as a Southeast Alaska resource. This item, salmon, was rated number eleven of the twenty on the list of consumed foods. First on the list was coffee with onions being last. Beef was rated number 14 with deer, moose or other natural meat sources not being listed (Table 1, Most Commonly consumed Foods by 363 Alaska Natives, 1987-1988, Southeast Alaska Regional Health Corporation).

Decreased dependency on the natural resources of the areas in which Native people and cultures live has been a common problem in the continuance of Native cultures. As with the American Indians of the lower forty-eight, a close bond between the natural resources of the land and the cultural commitments of the people has provided a continuance of the culture. With the advent of alternative food sources, transportation, education, etc., the tie to the land has been gradually decreased threatening the existence of the Native culture into the future. Now in Southeast Alaska, with legislation, court proceedings, alternative supply sources, the Alaska Native is suffering the same loss of bonding to the land. In order to preserve the tie and the dependency to the land, the demand on the right to subsist is paramount to the Native leaders of the Southeast communities.

SUBSISTENCE UNDER THE REVISED TLMP

Both subsistence and non-subsistence users are concerned about how the Revision will address subsistence issues. Public participation is an important part of identifying areas of concern and in providing information on the need for and location of subsistence resources as well as traditional use areas. Comments and information provided by Native associations and corporations, environmental organizations, regional fish and game advisory councils, state and federal agencies, and individuals will be studied and utilized by the Revision team. Comments were requested during the initial TLMP scoping process in Spring 1988. Numerous individuals or groups provided their input about how they felt subsistence needed to be addressed in the Tongass Plan Revision. Many indicated specific areas which they felt the most important to preserve for subsistence opportunities.

Forest Service subsistence management, in accordance with the policies found in Section 802, ensures the customary and traditional consumptive uses of fish, wildlife an other wild renewable resources on National Forest system lands in Alaska. Nonwasteful subsistence uses of fish and wildlife and other renewable resources will have priority when, under certain conditions, it is necessary to restrict the taking of these resources to assure the continued viability of a fish or wildlife population or the continuation of subsistence uses of such a population. Management of the subsistence use of fish and wildlife populations on the National Forests recognizes the State of Alaska's traditional role in the regulation of these populations on Federal public lands as well as on State and private lands in Alaska. Our policy is to cooperate with the State and adjacent private land owners to ensure that the subsistence opportunities for rural residents continue (1970/1950 letter, to Robert Loescher, from Michael A. Barton, June 14, 1989).

The State of Alaska plays a vital, cooperative role in the management and regulation of subsistence uses of fish and wildlife populations, as provided by ANILCA Section 805(d), through the passage of a State Subsistence Law implemented by the Boards of Fisheries and Game. These Boards determine when taking on public lands of fish and wildlife for nonwasteful subsistence uses shall be accorded priority over taking on such lands of fish and wildlife for other purposes as prescribed in Section 804 of ANILCA. In accord with ANILCA Section 806, the Federal land managing agencies in Alaska jointly monitor the State's provisions

for subsistence priority of fish and wildlife and report annually on the implementation set forth in Section 804. Criteria for Section 804 subsistence priority is based upon customary and direct dependence upon the fish and wildlife populations as the mainstay of livelihood, local residency and the availability of alternative resources (1970/1950 letter, to Robert Loescher, from Michael A. Barton, June 14, 1989).

There are no Federal laws that give subsistence the priority of first consideration over the other resources or uses of the Tongass National Forest or any other public lands found in Alaska. The policy of the Forest Service in Alaska and the underlying theme for subsistence in the revised Tongass Land Management Plan will be to provide rural Alaskan residents with the opportunity to continue a subsistence way of life. Subsistence provisions found in Title VIII of ANILCA are only one set of many sets of provisions of ANILCA as well as other laws and regulations that will be followed during the revision of the Tongass Plan.

Subsistence has been a principal consideration of the Tongass Plan Revision since the beginning of the process. Through the NEPA process, the subsistence issues and concerns have been identified during scoping and analysis of the current situation. Through the TRUCS mapping and data gathering processes, subsistence information will play a key factor in the alternative development phase. The community reviews of the TRUCS data will facilitate the verification process of the subsistence mapping and be carried into the alternative displays, effects evaluations and later into identification of a preferred alternative for the Forest Plan. Subsistence will be addressed in each of the alternatives displayed in detail and will culminate with a Section 810 evaluation in the Record of Decision.

The Tongass Land Management Plan Revision Process has developed twenty-four prescriptions that will permit activities to take place on specific areas of the Tongass. A specific subsistence prescription was not developed for the Plan's revision but rather subsistence is a consideration of each of the twenty-four developed. Due to subsistence uses and resources being compatible in varying degrees with each of the management prescriptions developed, a specific subsistence prescription was not necessary.

Subsistence opportunities will be considered through analysis of habitat capability or fish and wildlife in the Plan. An alternative for the current direction and a full range of alternatives deviating from it will display a full range of capabilities through a mix of the twenty-four management prescriptions. TRUCS as well as many of the State of Alaska's subsistence documents will be used as resources to determine where intensive subsistence use occurs. These intensive use areas will be considered during alternative formulation to determine how best to respond to the objectives of each alternative and provide for subsistence opportunities.

TRUCS

The historical record of subsistence use in Southeast Alaska, concerning amounts harvested, intensity of use, and user locations, is incomplete. With the exception of studies conducted in the early 1980's by ADF&G's Division of Subsistence, few comprehensive studies have been undertaken. As needs of subsistence users become of greater concern, more effort is being placed on obtaining more complete subsistence data. Realizing that substantial information on subsistence use of fish and game would be needed Tongass Land Management Plan Revision, the USDA Forest Service, in cooperation with the University of Alaska's Institute of Social and Economic Research (ISER) and the Alaska Department of Fish

and Game, Division of Subsistence undertook an effort to survey subsistence uses in the communities in Southeast Alaska. This work, known as the "Tongass Resource Use Cooperative Survey (TRUCS)" collected information from a sample of households in each of thirty communities. The research team conducted 1,465 personal interviews requesting 1987 harvest information. The information gathered concerned socioeconomic characteristics of the households, quantities and types of resources harvested, and areas used for harvesting.

The ISER research staff edited, coded, entered on computer, and verified questionnaire responses. The resulting data file was then examined by staff of the research team for errors or apparent anomalies. In a few instances the staff contacted respondents to confirm their answers. In most cases, however, the verbatim comments of the respondents recorded on the questionnaires clarified or substantiated unusual responses.

The report is intended to provide an in-depth profile of current subsistence uses in Southeast Alaska. While in-depth, the report only looks at a "snap-shot" point in time and will need to be updated for future project work. This research was undertaken in part to understand the role of subsistence uses of natural resources in the lives of Southeast Alaska's rural residents. In addition to the survey questions, a major part of the interview was devoted to mapping subsistence harvest areas. Respondents mapped areas used to harvest deer, salmon, other finfish, marine invertebrates, and marine mammals. Information was recorded on mylar using pin-registered mylar USGS 1:250,000 base maps for reference. This map information will aid in making land management decisions on or near important subsistence use areas.

The digitized data has been entered into a GIS data base through a contract with ADF&G Division of Subsistence. This data base will be used in forming plan alternatives and analyzing the effects of resource utilization on that of the subsistence activities found to occur in specific areas of the Tongass and for the Tongass as-a-whole. The data base will also be used by the Alaska Department of Fish and Game, and other State and Federal agencies when making future decisions affecting subsistence uses in Southeast Alaska.

COMMUNITY REVIEWS OF TRUCS

The Forest Service is currently beginning the process for the development of the community reviews of the TRUCS maps. During the week of December 7, 1989, the Forest Service met with the Alaska Department of Fish and Game (Subsistence Division), Harold Martin (Tlingit-Haida Central Council), and Arlene Dilts (Sealaska), to discuss means of making the reviews as productive as possible. Sealaska has stated that the TRUCS data gathered to date is insufficient due to the lack of reference to cultural boundaries which are present in the Native heritage of the State. Sealaska has stated that this is the historic means by which these areas of the Tongass were managed for use of the natural resources found in them. During the meeting to discuss plans on content and time frames for reviews, cultural boundaries will be addressed to establish a means for documenting their existence within the confines of the Tongass National Forest.

In order that the TRUCS mapping project be utilized effectively in the analysis of alternatives developed for the Tongass Land Management Plan Revision, review of the work is necessary to verify its content. Minor review has been undertaken by a few communities in Southeast due to a portion of the mapping work having been sent to community leaders in these areas. The remainder of the communities in Southeast have not yet seen the product of their input for the TRUCS project. Reviews of the data has been tentatively set for the January 1990. Alternative

development for the Revision process will also begin in January with culmination of the first round ending in late April or early May. During the late spring or early summer of 1990, the TRUCS data will receive concentrated analysis of the effects of various Tongass activities on subsistence. The community reviews will play a vital role in establishing the credibility of the TRUCS survey mapping project for the TRUCS survey and provide valuable insight into locations of subsistence uses.

During the community review process across the Tongass National Forest, the TRUCS mapping products will be combined into a single composite map for all of Southeast Alaska. The mapping of intensively used areas as well as the extent of use by a community may be both or individually utilized to display subsistence use across the Tongass. As work on the development of the composite map progresses, review of the results will be provided to interested agencies as well as private organizations.

ANILCA SECTION 810 DETERMINATIONS

ANILCA Section 810 is a procedural requirement of law that Federal land managing agencies must apply to land use decisions. The Forest Service working with other Federal agencies, Alaska Department of Fish and Game and the Alaska Federation of Natives jointly developed a set of Section 810 Guidelines which were approved by the Alaska Land Use Council (ALUC) in 1984. In 1985, these standards and guidelines were then incorporated into the Forest Service Handbook 2609.25 as policy. The Section 810 process is required for any action to withdraw, reserve or otherwise permit the use, occupancy, or disposition of public lands in Alaska where there is discretion sufficient to substantially affect alternative means to implementing the proposed action. Following the evaluation of the effect of the proposed action on subsistence, a finding is made on whether or not the proposed action may have a significant restriction on subsistence uses. If there is a possible threat of significant restriction due to the proposed action or when combined with those of past, present, and reasonably foreseeable future actions, then an affected community notice, hearing and determination is made in accord with the requirements of Section 810(a) (1)-(3).

The Section 810(a)(3) determination describes the reasons the significant restriction of subsistence uses may be necessary, and is consistent with sound management principles for the utilization of the public lands; that the minimum amount of lands will be utilized; and that reasonable steps will be taken to minimize the adverse impacts on subsistence uses and resources. Following compliance with these procedural steps to reduce or eliminate any significant restriction, the Federal land managing agency may then proceed to manage or dispose of lands under their jurisdiction as provided by law.

The Tongass Land Management Plan Revision is a document that will determine the fate of the Tongass National Forest for the next planning period (10-15 years). A Section 810 evaluation will be performed on the Plan's proposed action of the plan to determine if it will have an effect on the availability of the subsistence resources and uses. If during the evaluation, a determination is made that the Plan's proposed actions of the plan will have a significant effect on the subsistence resources and uses, then notices, hearings and determinations will be made in accord with the requirements of ANILCA.

EXISTING DIRECTION

The management of the National Forests must comply with numerous laws and regulations. The subsistence mandate provided in ANILCA is just one of the many pieces of legislation affecting the management of public lands. In addition, land management is directed through the Multiple Use and Sustained Yield Act of 1960 (16 U.S.C. Sections 528-531) and the National Forest Management Act of 1976 (16 U.S.C. Section 472(a) et seq). "Multiple use" means that the agency will manage for "all the various renewable surface resources of the National Forests so that they are utilized in the combination that will best meet the needs of the American people" (16 U.S.C. Section 531). Sustained yield means "the achievement and maintenance in perpetuity of a high-level annual or regular periodic output of the various renewable resources of the National Forests without impairment of the productivity of the land." (16 U.S.C. Section 531). These laws, along with the provisions provided in ANILCA and other direction, must be considered when land management decisions effecting subsistence opportunities are made.

ANILCA provides a broad outline of how subsistence is to be considered in land use decisionmaking. More specific direction for the Forest Service is provided in the Subsistence Management and Use Handbook (FSH 2609.25). This Regional policy directive, in compliance with Section 810 of ANILCA, required documentation of the process used, analyses conducted, and rationale employed in determining withdrawal, reservation, lease, or otherwise permitting the use, occupancy, or disposition of public lands on which subsistence uses are authorized. The handbook was developed using the direction provided in ANILCA, and the 1984 implementation procedures approved by the Alaska Land Use Council.

LEGISLATIVE

Multiple Use Act

Sec. 2

A. Multiple-Use Sustained-Yield Act (P.L. 86-517, Act of 12 June 1960)
The Secretary of Agriculture is authorized and directed to develop and administer the renewable surface resources of the National Forests for multiple use and sustained yield of the several products and services obtained therefrom. In the administration of the National Forest due consideration shall be given to the relative values of the various resources in particular areas. The establishment and maintenance of areas of wilderness are consistent with the purposes and provisions of this Act.

Sec. 4

(a) "Multiple use" means the management of all the various renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

ANCSA

Sec. 7

B. ANSCA (P.L. 92-203, Alaska Native Claims Settlement Act of 18 Dec. 1971)
Establishment of the twelve geographic areas that were titled Regional Corporations, for the purpose of identifying Natives of common heritage and of sharing common interests. The Tlingit-Haida Central Council was established under this law and encompassed the Southeast Panhandle of Alaska including that of Metlakatla.

Sec. 8

Establishment of the Village corporations for the purpose of receiving lands and benefits under the ANCSA.

Sec. 16

The Tlingit-Haida Settlement
This section of the ANCSA withdrew public lands for Southeast Alaskan Native Village Corporation ownership to be run as seen fit by the local corporation. This meant that the corporation in charge of management for the land base could utilize these lands for profit or for customary and traditional uses. The total land selection was to include 23,040 acres for each of the ten corporations, including the township or townships in which all or part of the Native village was located plus lands contiguous to or cornered on such townships which had previously been withdrawn from those townships.

RPA
Sec. 2 (3)

C. Forest and Rangeland Renewable Resources Planning Act (P.L. 93-378, 17 August 1974)
To serve the national interest, the renewable resource program must be based on a comprehensive assessment of present and anticipated uses, demand for, and supply of renewable resources from the Nation's public and private forests and rangelands, through analysis of environmental and economic impacts, coordination of multiple use and sustained yield opportunities.

Sec 5

As a part of the [RPA] Assessment, the Secretary of Agriculture shall develop and maintain on a continuing basis a comprehensive and appropriately detailed inventory of all National Forest System lands and renewable resources. This inventory shall be kept current so as to reflect changes in conditions and identify new and emerging resources and values.

NFMA

D. National Forest Management Act (NFMA, P.L. 94-588, Act of 22 October 1976)
The National Forest Management Act of 1976 amends the Renewable Resource Planning Act of 1974 in several sections as well as introduces new language through the NFMA. Specifically the NFMA amends sections 2-11 of the Resource Protection Act and adds sections 13-16:

Sec. 6

Provides the public, other Federal and State and local agencies avenues for participation in the development of management plans relating to the management of the National Forest System lands. Provisions are also set for the coordination of activities on National Forest lands between the resource specialists. The final product of the coordination effort is to be displayed in one document so as to consolidate and aid in the analysis and review by public, federal, state and local agencies.

ANILCA
Sec. 803

E. ANILCA (Alaska National Interest Lands Conservation Act(P.L. 96-487, Act of 2 December 1980)

Defines "subsistence uses" as meaning the "customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation: for the making and selling of handicraft article out of nonedible byproducts of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade."

Sec. 804

Provides for priority use of the taking of fish and wildlife on public lands to nonwasteful subsistence uses over the uses of the fish and wildlife resources for other purposes.

Sec. 805

Establishes six Alaska subsistence resource regions which taken together, include all public lands.

Establishes local advisory committees within each region.

Establishes a regional advisory council in each subsistence resource region.

Sec. 806 Establishes a Federal monitoring mechanism to monitor the provisions by the State of the subsistence preference set forth in section 804 and shall advise on the effectiveness of the implementation of this title including the State's provision of such preference.

Sec. 810 Provides for the evaluation of proposed activities on National Forest System lands in Alaska where subsistence use occurs, for the purpose of analyzing the effects of such use, the availability of other lands for the purposes sought to be achieved, and other alternatives which would reduce or eliminate the use, occupancy, or disposition of public lands needed for subsistence purposes. Subsistence uses shall not be significantly restricted until the head of the Federal agency managing the land:

1. Gives notice to the appropriate State agency and the appropriate local committees and regional councils established pursuant to section 805.
2. gives notice of, and holds a hearing in the vicinity of the area involved; and
3. determines that (a) such a significant restriction of subsistence uses is necessary, consistent with sound management principles for the utilization of the public lands, (b) the proposed activity will involve the minimal amount of public lands necessary to accomplish the purpose of such use, occupancy, or other disposition, and (c) reasonable steps will be taken to minimize adverse impacts upon subsistence uses and resources resulting from such actions.

Sec. 811 Ensures that rural residents engaged in subsistence uses shall have reasonable access to subsistence resources on public lands.

ADMINISTRATIVE GUIDELINES

The following sections was quoted from "Wilderness Benchmark, 1988." The political context of resource allocation in Alaska has resulted in legal definitions of subsistence considerably different than the traditional image of small, self-reliant villages providing for their own survival. During passage of both State and Federal law, political realities dictated that legislatively designated subsistence rights be conveyed to all rural Alaskans, both Native and non-Native alike, irrespective of income. Thus, subsistence uses on public lands in Alaska are viewed by Congress and the State of Alaska as customary and traditional activities differentiated only by rural versus non-rural residency, rather than ethnicity, economic status, or length of residence. This has resulted in rather anomalous situations in which extremely wealthy rural residents (both Native and non-Native) possess subsistence rights, while at the same time, urban residents--regardless of their material or cultural needs--have been denied subsistence rights.

Nevertheless, Alaska has been in the policy forefront with respect to recognition and protection of subsistence-use opportunities through Federal and State statutes. Consequently, the administrative guidelines designed to implement statutory requirements regarding subsistence are relevant only to Alaska. Although application of these guidelines is not germane to the public lands in States other than Alaska, a brief summary of legislative requirements and agency implementing regulations will illustrate Congressional intent regarding

subsistence as a non-recreational use of public lands including wilderness in Alaska.

The Alaska National Interest Lands Conservation Act (ANILCA) of 1980 is the principal law governing subsistence management and use on public Federal lands, including congressionally-designated wilderness in Alaska. In Title VIII of ANILCA, subsistence uses are defined, subsistence rights are conveyed, and subsistence management direction is provided. As used in ANILCA, the term subsistence...

> ...means the customary and traditional uses by rural Alaska residents of wild, renewable resources for direct personal or family consumption as food, shelter, fuel, clothing, tools, or transportation; for the making and selling of handicraft articles out of non-edible by products of fish and wildlife resources taken for personal or family consumption; for barter, or sharing for personal or family consumption; and for customary trade.

In addition to defining subsistence uses, ANILCA recognizes the importance of providing continuing opportunities for subsistence on public lands in Alaska. To provide for the continuation of subsistence opportunities, Congress mandated that "...the utilization of the public lands in Alaska is to cause the least adverse impact possible on rural residents who depend upon subsistence uses of the resources of such lands...." Finally, in a visionary attempt to ensure that subsistence opportunities are maintained in perpetuity, Congress mandated that "...the taking on public lands of fish and wildlife for non-wasteful subsistence uses shall be accorded priority over the taking on such lands of fish and wildlife for other purposes." This section of ANILCA has been interpreted to mean that subsistence users have priority access to fish and wildlife resources over recreational and commercial users during those times when it is necessary to restrict hunting and fishing in order to protect the continued viability of resource populations.

In an attempt to ensure consistent implementation of the subsistence provisions of ANILCA, the Alaska Land Use Council (composed of representatives from selected Native regional corporations and various State and Federal agencies) developed guidelines for incorporating subsistence considerations into Federal land-use decision-making processes in Alaska. These guidelines have been integrated into the land-use planning processes and on-going land management programs of Federal agencies in Alaska, such as the National Park Service, the Fish and Wildlife Service, the Bureau of Land Management, and the Forest Service. Although the various Federal agencies having authority for wilderness management in Alaska have developed regulations implementing the provisions of ANILCA into their management programs, the following restricts the focus here to administrative guidelines developed by the Forest Service.

In addition to the provisions of ANILCA, the Code of Federal Regulations, and guidelines of the Alaska Land Use Council, key Forest Service directives concerning subsistence uses are contained in internal manuals and handbook governing agency planning processes and management activities. Consistent with ANILCA, subsistence policies apply to all lands managed by the Forest Service in Alaska, including wilderness. In the management of wilderness lands designated by Congress, it is Forest Service policy that the provisions of the Wilderness Act of 1964 apply in providing direction for wilderness management unless specific exceptions are provided by ANILCA.

In 1980, ANILCA created approximately 4.4 million acres of wilderness on Forest Service-managed lands in Southeast Alaska. Procedural guidance for incorporating subsistence considerations into land use planning and decision-making is contained in the Forest Service (Alaska Region) handbook 2609.25 (Subsistence Management and Use). Other guidance for managing subsistence uses is provided in Alaska Region Supplement 34 to Forest Service Manual (FSM), chapter 2320, Wilderness, Primitive Areas, and Wilderness Study Areas. FSM 2320 defines subsistence uses, reiterates the policy of causing the least adverse impact possible upon rural residents who depend upon subsistence uses, and reaffirms the priority of subsistence uses over other uses of fish and wildlife when it is necessary to restrict harvest in order to assure viability of fish or wildlife populations.

In addition, FSM 2320 draws on other provisions of ANILCA in order to ensure that continued access to subsistence resources is available in wilderness:

e. Rural residents engaged in subsistence uses shall have reasonable access to subsistence resources. This is not tied to historic use areas but to availability of resources. Hence, the area used for subsistence may shift as the fish and wildlife populations or abundance shifts.

f. Snowmobiles, motorboats and other means of surface transportation shall be permitted for subsistence purposes, subject to reasonable regulation to protect other resource values. This does not foreclose the use of new, as yet unidentified, means of surface transportation, so long as such means are subject to reasonable regulation necessary to prevent waste or damage to fish, wildlife, or terrain.

In summary, subsistence uses have been formally recognized by law in the State of Alaska. Key federal statutory and regulatory guidance for managing subsistence uses on both wilderness and non-wilderness public lands in contained in the Alaska National Interest Lands Conservation Act, guidelines developed by the Alaska Land Use Council, and agency procedures implementing ANILCA. Within the Forest Service, principal policies for managing subsistence in wilderness are contained in FSM 2320.

REGULATIONS (CODE OF FEDERAL REGULATIONS-CFR)

36 CFR 219, National Forest System Land and Resource Management Planning
These regulations set forth a process for developing land and resource management plans for the National Forest System as required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA). They prescribe how land and resource management planning is to be conducted on the National Forest System lands. The resulting plans shall provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximizes long-term net public benefits in an environmentally sound manner.

Plans guide all natural resource management activities and establish management standards and guidelines for the National Forest System. They shall determine resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management.

FOREST SERVICE MANUALS (FSM)

FSM 2320-Wilderness, Primitive and Wilderness Study Areas

FOREST SERVICE HANDBOOKS (FSH)

FSH 2609.25-Subsistence Management and Use

ENVIRONMENTAL IMPACT STATEMENTS

Southeast Area Guide (August 1977)
The Area Guide provided a foundation and a focus for developing the Tongass Land Management Plan. The Plan included allocations of the total land base to provide the public with a mix of differing land use opportunities. The Tongass Land Management Planning process utilized the issues identified in the Area Guide and defined where combinations of land use opportunities would be made available.

Alaska Regional Guide (November 1983)
The primary purpose of the Alaska Regional Guide was to provide national and Regional direction to the two National Forests within the Alaska Region for land and resource management planning efforts. The Guide facilitates National Forest planning by providing Regional standards and guidelines for addressing major issues and management concerns and by displaying tentative resource objectives for each National Forest, based on objectives that were assigned to the Region as a whole in the 1980 National RPA recommended Program. While the Guide ensures that a consistent approach to National Forest planning is followed throughout the Region, it allows the individual Forests considerable latitude in their formulation of National Forest Land and Resource Management Plans. The Guide also is intended to help coordinate management of the National Forest System in the Alaska Region with other Forest Service programs (programs that assist private landowners and State and local governments in managing and protecting their forest resources, as well as an extensive forestry research program

Tongass Land Management Plan Parts I and II (March 1979)
The TLMP Part I FEIS is current management direction for the Tongass National Forest. The issues covered by the TLMP Final Environmental Impact Statement were basically land allocation, community lifestyles, community stability and jobs, wilderness preservation, Admiralty Island allocation, fish and wildlife protection, aquaculture and minerals development. All of the Tongass National Forest System Lands were allocated to one of four different land use designations (LUD's). These designations were basically wilderness (LUD 1), roadless (LUD 2), amenity values (LUD 3) and commodity values (LUD 4). The TLMP was intended to stabilize the land management direction for the Tongass over its ten-year life and to facilitate an orderly use of the many amenity and commodity values the Tongass National Forest contains.

The TLMP Part II FEIS contains the specific management direction/emphasis descriptions and scheduled management activities for each of the individually named and numbered VCU's. Activities were schedule for the first and second five-year periods of the plan with a future schedule spanning the following three decades. The scheduled activities of the Management Area, along with the output targets and other aspects of TLMP management direction, provided a foundation for the development of annual integrated multi-resource programs in the program development and budgeting process.

D. Tongass Land Management Plan Amended Winter 1985-86
The TLMP amendment of the TLMP took into account changes that have occurred since the approval of the 1979 TLMP. These changes include the passage of the Alaska National Interest Lands Conservation Act (ANILCA), the reestablishment of ranger districts, the passage of six annual budgets, and the completion of various NEPA documents.

THREATENED, ENDANGERED, CANDIDATE, AND SENSITIVE SPECIES

OVERVIEW

Threatened and Endangered Species

Federally listed Threatened and Endangered species are those plant and animal species formally listed by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, under authority of the Endangered Species Act of 1973, as amended. An endangered species is defined as one which is in danger of extinction throughout all or a significant portion of its range. A threatened species is defined as one which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Candidate Species

Candidate species are those being considered for listing as threatened or endangered by the U.S. Fish and Wildlife Service and National Marine Fisheries Service. Candidate species fall into three categories: Category 1 is comprised of species about which the agencies currently have substantial information to support the biological appropriateness of proposing to list them as endangered or threatened. Development and publication of proposed rules on these species are anticipated. Category 2 comprises species, which information, now in possession of the agencies, indicates that proposing to list as endangered or threatened is possibly appropriate, but on which conclusive biological vulnerability and threat to species data are not currently available to support proposed rules. Category 3 comprises species that were once considered for listing as endangered or threatened, but are not currently receiving such consideration; these species are either now extinct, no longer taxonomically recognized as a species or subspecies, or are more widespread and abundant than previously thought. Species listed as threatened or endangered are provided statutory protection under the Endangered Species Act of 1973, as amended; candidate species are not provided statutory protection.

State Endangered Species

The State of Alaska has an Endangered Species Law which authorizes the Commissioner of the Alaska Department of Fish and Game to list Alaska endangered species.

Sensitive Species

Sensitive species are those plant and animal species identified by the Regional Forester whose population viability is a concern on National Forests within the Region. Sensitive species may also be those species whose current populations and/or habitats are reduced or restricted, their habitats and/or populations are considered vulnerable to various management activities, and special management emphasis is needed to prevent the species from becoming threatened or endangered. Identification of sensitive species and emphasis on the management of sensitive species habitat are Forest Service policy and not directly related to Federally designated threatened and endangered species which are protected under the Endangered Species Act. The Forest Service goal for sensitive species management is to ensure that species numbers and population distribution are adequate so that no Federal listing will be required and no Forest extirpation will occur.

Table 3-120 summarizes threatened, endangered, candidate and sensitive species which occur on or adjacent to the Tongass National Forest.

TABLE 3-120
THREATENED, ENDANGERED, CANDIDATE AND SENSITIVE SPECIES OCCURRING ON OR ADJACENT TO THE TONGASS NF

Species	Federally Listed T/E	Federally Listed Candidate	State Listed Endangered	Regional Sensitive 1/
Humpback Whale (Megaptera novaeangliae)	E		E	
Gray Whale (Eschrichtius robustus)	E			
Sei Whale (Balaenoptera borealis)	E			
Sperm Whale (Physeter macrocephalus)	E			
Bowhead Whale (Baleana mysticetus)	E			
Fin Whale (Balaenoptera physalus)	E			
Blue Whale (Balaenoptera musculus)	E		E	
Black Right Whale (Balaena glacialis)	E		E	
American Peregrine Falcon (Falco peregrinus anatum)	E		E	
Arctic Peregrine Falcon (Falco peregrinus tundrius)	T		E	
Thlaspi arcticum (plant)		2		
Glacier Bay Water Shrew (Sores alaskanus)		2		
North American Lynx (Felis lynx canadensis)		2		
Marbled Murrelet (Brachyramphus marmoratum)		2		
Prince of Wales Flying Squirrel (Glaucomys sabrinus griseifrons)		3c 2/		
Sumez Island Ermine (Mustela erminea seclusa)		3c 2/		

Source: Official correspondence with the U. S. Fish and Wildlife Service, National Marine Fisheries Service, Alaska Department of Fish and Game.
1/ At the present time, no sensitive species have been listed by the Regional Forester.
2/ Category 3c includes species that are now considered to be more abundant or widespread, and/or substantially less subject to identifiable threats, than previously thought.

SUPPLY/INVENTORY ENDANGERED SPECIES

The following summary of the whales was provided by the National Marine Fisheries Service (letter September 11, 1987) and Alaska Department of Fish and Game (letter February 6, 1987).

Humpback Whales

Humpback whales are the most abundant endangered whales that occur in Southeast Alaskan waters. Their populations in the North Pacific are about 1,200, which is about 8 percent of pre-whaling numbers. During the summer feeding season, these whales range widely from the subarctic boundary (about 40 degrees North Latitude) north into the Chukchi Sea. The greatest population densities are reached in certain inshore waters, where the animals appear to be largely resident during the summer and autumn. Baker et al. (1985) estimate that 300-350 humpback whales inhabit Southeast Alaska during the summer and fall. The main foods of humpback whales in Southeastern Alaska are euphausiaceans (Euphausia pacifica), herring (Clupea harengus), and capelin (Mallotus villosus). Because the humpback inhabits shallow coastal areas, it is increasingly exposed to human activity. Consequently, these whales may be more susceptible to confrontational disturbance, displacement, and loss of habitat from environmental degradation than some other whale species. Humpbacks summering in Southeast Alaska have been linked to each of the three wintering areas in Mexico, Hawaii, and Asia.

Gray Whales

Gray whales are endemic to the north Pacific. The eastern Pacific population now numbers about 16,000 animals, about the same as existed prior to commercial whaling; whereas the western Pacific population is apparently on the verge of extinction. The eastern population spends the summer in the northern Bering and Chukchi Seas, and migrates along the coast to winter grounds on the west coast of Baja California, where the calves are born. Twice each year virtually the entire eastern Pacific population of gray whales passes along the outer coast, mostly within 5 kilometers of the beach. The northward migration of animals, by Southeast Alaska, without calves, takes place from March to early May, with a peak in early April. Cows with calves migrate later. The southward migration takes place during November and December. Gray whales do not feed while migrating along the California coast, but possible surface-feeding behavior has been reported during spring migration at Cape St. Elias. On the summer grounds gray whales feed primarily on benthic gammaridean amphipods.

Sei and Sperm Whales

The sei and sperm whales generally move in and out of the offshore areas seasonally. The population of the sperm whale is still considered to be at harvestable levels by the International Whaling Commission with a world population exceeding 980,000 and an eastern North Pacific population of 274,000, 80 percent of pre-exploitation levels. Estimates of the North Pacific population of the sei whale range from 22,000 to 37,000 animals, 65 percent of pre-exploitation levels. Whaling of this stock ceased after 1975 when sei whales were protected.

Bowhead Whale

At about 25 percent of its pre-exploitation levels, the bowhead whale population is in excess of 4,000 animals and is increasing. There is a low and closely regulated harvest of bowheads. The bowhead whale has not been reported in the Gulf of Alaska.

Fin Whale

The North Pacific fin whale population is between 15,000 and 19,000 animals, about 40 percent of historic levels. Fin whales will generally move in and out of the offshore areas seasonally and are infrequently taken by Alaska Natives.

Blue Whale

The North Pacific population of blue whales is 1,600, less than one-third of historic levels. Although only occasionally found in coastal waters, blue whales are observed in the Aleutian Islands and enter the Chukchi Sea through passes in the Aleutian Chain. Survey information is limited, but there is no evidence that North Pacific stocks are recovering despite their complete protection for twenty years.

Right Whale

Known to occur in the Gulf of Alaska, eastern Aleutian Islands, and southcentral Bering Sea, the North Pacific population of the right whale may be as low as 100 animals. They were formerly found near Kodiak Island and off the Alaska panhandle. Because of their low numbers, their use of coastal waters, and apparent low reproductive rate, right whales may be the most vulnerable of all whales to habitat incursion and deterioration.

American Peregrine Falcon

The American peregrine falcon is primarily associated with interior Alaska for breeding, nesting and rearing of young; it occurs in Southeast Alaska only during migration periods. Population numbers in Alaska are continuing to increase (ADF&G letter dated Feb. 6, 1987).

Arctic Peregrine Falcon	The arctic peregrine falcon is primarily associated with the area north of the Brooks Range and Seward Peninsula; it occurs in Southeast Alaska only during migration periods. Population numbers in Alaska are continuing to increase (ADF&G letter dated Feb. 6, 1987).
PLANTS	There are no endangered plant species located on the Tongass National Forest.
CANDIDATE SPECIES WILDIFE AND FISH Glacier Bay Water Shrew	The Glacier Bay water shrew has only been documented to exist in one locality: Point Gustavus, Alaska. To our knowledge, there are only two sources of literature documenting its existence: 1) Proceeding of the Washington Academy of Science (2):18, March 14, 1900; 2) Journal of Mammalogy (7):58, February 15, 1926. These two sources are cited in The Mammals of North America by Hall and Kelson, 1959. Hall and Kelson suggest that it may be a sub-species of Sorex palustris.
	Other than the documentation that the species exists at Point Gustavus, no other information is available; nothing is known about its distribution, population status, or habitat requirements.
North American Lynx	The North American lynx is found in very low numbers only on the mainland in Southeast Alaska. It is legally harvested during the trapping seasons. The snowshoe hare (Lepus americanus), its principal prey species, is restricted to the mainland and is found primarily on the glacial flats and river valleys. Hare populations never reach the high densities attained at cyclic peaks in the interior (Meehan 1974), and this may be a principal factor for the very low numbers of lynx. There is current debate over whether the species should continue to be trapped.
Marbled murrelet	The marbled murrelet is a robin-sized seabird that belongs to the family Alcidae. The following information on the marbled murrelet is taken from Marshall (1988): It is found throughout the North Pacific, with two subspecies being recognized. The Asiatic subspecies ranges from Kamchatka south to Japan; the North American subspecies ranges from the Aleutian Islands, Kodiak Island and Kenai Peninsula of Alaska south to central California, with individuals wintering as far south as southern California.
	The species feeds below the water's surface on small fish and invertebrates. Inland saltwaters, and occasionally inland freshwater lakes, are also used.
	Unlike most other species in the family Alcidae, it does not nest in colonies, although at some sites it may nest in small aggregations. In parts of Alaska where well-developed, coniferous forests are absent, ground nests have been found on steep slopes in tundra or alpine habitat. One nest on the Alaskan tundra was found in a rocky cavity. From Southeast Alaska south, the species has been found nesting only in large conifers. Only four definite tree nests have been found; two in Siberia, and two in North America. These nests consisted of depressions in moss or lichens on the branches of old-growth conifers.
	Over 100,000 of the species occur in Alaska, and many thousands range off British Columbia coasts and inland waterways. Summer population estimates for the lower Pacific states are 1,900-3,500 breeding pairs in Washington, less than 2,400 breeding pairs in Oregon, and less than 1,000 breeding pairs in California. Marbled murrelets have a low reproductive rate, with only one egg laid per clutch.

On June 12, 1989, Peter Paton of the Pacific Southwest Forest and Range Experiment Station, provided a workshop at the Juneau Ranger District to provide an update on current knowledge and research for the marbled murrelet. The following is information he provided at the workshop (ref. June 12, 1989 meeting notes):

> Two sub-species of the marbled murrelet exist: a Siberian sub-species and a North American sub-species. They feed on fish and krill in the ocean, are usually found within a couple miles of the shore, rarely found more than 4 miles from shore.
>
> They nest on land and lay only one egg. Seven ground nests have been found for the Siberian sub-species, one nest in a rocky crevice. Up until 1974, no nests had been found for the North American sub-species. On August 7, 1974, the first nest was found in a California State Park. Located right above a campsite in a campground, this nest was 10 miles inland from the Pacific Ocean, 140 feet high in an old-growth Douglas-fir tree on a 45 cm wide limb. In 1984 during a marbled murrelet research project conducted by the Alaska Department of Fish and Game, a tree nest was found on Baranof Island. This nest was on a large horizontal limb, 25 meters up in a mountain hemlock tree. Tree nests have been documented in the Soviet Union; one of the nests was in the top of a broken snag. In 1989, two more tree nests were found in California. Both nests were in large Douglas-fir trees, on large horizontal limbs. Both nests were watched 24 hours a day. A newly hatched bird at one of these nests was carried off by a raven.
>
> It is reported that Bob Armstrong found a marbled murrelet egg along the Treadwell Trail on Douglas Island during July 1989. Arlene Doyle found a bird sitting on the ground 5 miles inland in a stand of trees at Yakutat. In either case, no nests were found.
>
> Both males and females incubate marbled murrelet eggs. One bird stays at the nest for 24 hours, while the other is feeding on the ocean. After hatching their young, the adults only stay at the nest with the young bird for about 4 days. After that, the young bird is left alone in the nest, except when the adults return to the nest to feed.
>
> Except for the fall period when they are molting, flightless, and stay on the ocean, birds have been known to fly to tree stands during every month of the year. In California, birds have been found 25 miles inland.
>
> Current marbled murrelet research efforts are aimed at developing techniques for detecting birds as they fly into stands, locating nests, and identifying tree and stand habitat requirements. Evidence to date suggests that birds are using old-growth and not young second-growth stands. Due to the scarcity of older second-growth stands anywhere in their range, information on their use of older second growth is lacking.
>
> Marbled murrelets may be a species which shows a habitat/use relationship with the size of its preferred habitats. Some preliminary data from current research efforts show the highest number of bird detections are in old-growth patches over 500 acres in size, fewer detections are in old-growth patches 100-500 acres in size; no detections have been recorded in old-growth patches less than 100 acres in size (Figure 3-37). However, it is emphasized that this is only preliminary data analysis. Some of the

larger blocks of old growth are nearer the ocean, and this could be a factor influencing the number of bird detections rather than the result of old-growth patch size. Marbled murrelets are also social in nature, so larger blocks would naturally be expected to have more birds, and therefore, a higher detection rate, than smaller blocks with fewer birds.

There are some indications that uneven-aged timber management may help maintain some degree of habitat and use.

Current populations for the marbled murrelets are estimated at: California - 2,000; Oregon - 2500; Washington - 10,000; Alaska - 250,000 up to millions; British Columbia - unknown.

In a letter dated August 9, 1989, Forest biologist Cole Crocker-Bedford documents some methodology on doing marbled murrelet surveys, and discusses the results of some initial survey efforts made during the summer of 1989. These initial surveys were primarily aimed at learning survey techniques for future survey work.

There are many unknowns pertaining to the habitat needs of this species. Some of them are: We do not know if the birds use the same tree and limb year after year. There is no data on how many birds or pairs will nest in an area. There is no data on use of older second-growth stands. With one egg per pair, there is need to understand population dynamics for the species. Here in Alaska where there is still a large amount of old growth, the species is not evenly distributed in relation to the old growth - so we need to understand all of the factors influencing its distribution. Old growth is not the only factor which may be influencing populations; other known factors include oil spills, predation, and commercial fishing (murrelets are caught in fishing nets).

Prince of Wales Flying Squirrel

In a June 5, 1987, memorandum, the U.S. Fish and Wildlife Service recommended changing the Prince of Wales flying squirrel from a Category 2 candidate species to a Category 3c candidate species. In making this recommendation, the U.S. Fish and Wildlife Service provided the following information on the Prince of Wales flying squirrel:

> It is described as a unique subspecies endemic to Prince of Wales (POW) Island by Howell (1934). In Howells's original description, the flying squirrels' status appeared to be unknown and was described as "scarce on the island." But in contrast to Howell's 1934 account, the flying squirrel is not scarce on POW Island. In fact, results from a survey of local trappers indicated that it is present in substantial numbers and is distributed across at least the northern third of the island.
>
> The squirrel is known to be largely dependent on old-growth forest for both nesting and foraging habitat. Current estimates of old growth harvesting on Prince of Wales Island indicate that enough old growth will remain for populations of flying squirrels. Noble and Harrington (1978) examined the density of snags in the mature forest on POW Island and found that snags were present at densities up to 60 per acre -- far in excess of flying squirrel habitat requirements. The squirrel is also apparently coexisting in healthy numbers with introduced marten on the island.
>
> Fay (1985) has suggested a taxonomic re-evaluation is needed for the Prince of Wales flying squirrel.

The flying squirrel is a species which shows a habitat use relationship with the size of its preferred habitats (ref. July 31 and August 1, 1989 interagency workshop). Optimum use occurs when patches of preferred habitat are greater than 300 acres, and use declines with decreasing patch size; it becomes zero when patches are less than 25 acres (Figure 3-38).

Suemez Island Ermine In a June 5, 1987, memorandum, the U.S. Fish and Wildlife Service recommended changing the Suemez Island ermine from a Category 2 candidate species to a Category 3c candidate species. In making this recommendation, the U.S. Fish and Wildlife Service provided the following information on the Suemez Island ermine:

> This subspecies of ermine is described from the skull of a single male specimen collected by George Willett in 1920. It is known only from Suemez Island. No subsequent information on the subspecies was available until the early 1980's when a trapper reported catching at least two individuals. More recent surveys of trappers by ADF&G has indicated that Suemez has high populations of ermine.
>
> Ermine are known to utilize a variety of habitats and are not dependent on old-growth forest, since their chief prey items include voles, other small rodents, small birds, fish and insects, prey availability may temporarily increase following logging practices.

Fay (1985) has suggested a taxonomic re-evaluation is needed for the Suemez Island ermine.

PLANTS

Thlaspi articum The plant, Thlaspi arcticum, is a white to lavender flowered mustard in the family, Cruciferae. This plant grows on well-drained sites on alpine slopes, dry ridges, and especially in the sands and gravels of low river terraces and on active floodplains. Although this species is now known from a number of widely spaced locations in Alaska and the Yukon, most of the reports are of one or a very few individuals. The only large populations known are on the Arctic Slope in areas currently being considered for oil exploration and development (Murray and Lipkin 1987). In Southeast Alaska, the only known location is in the Lynn Canal Area.

FIGURE 3-38

PRELIMINARY DATA ANALYSIS ON THE EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT MARBLED MURRELETS

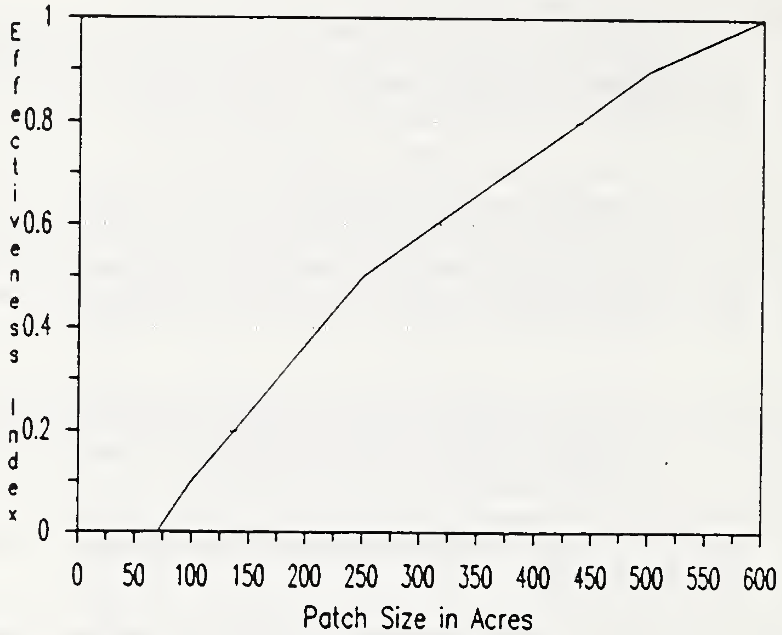
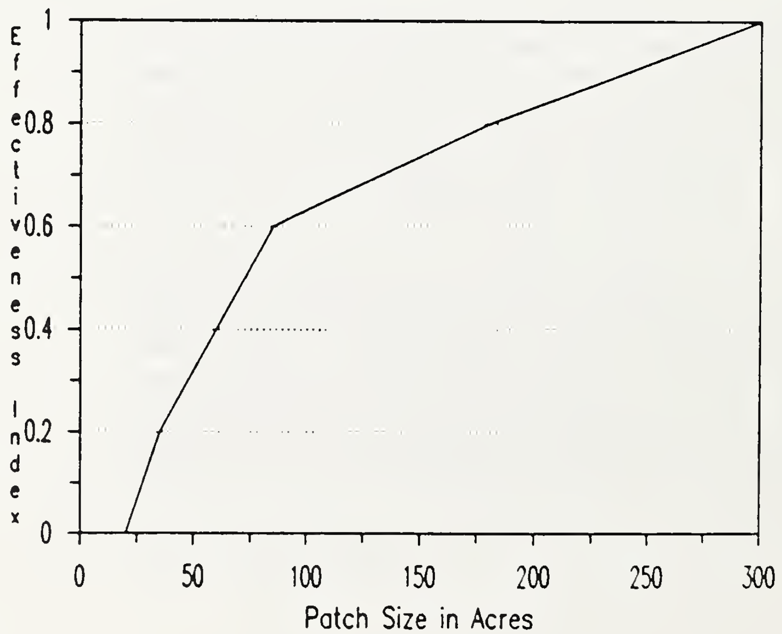


FIGURE 3-38

EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT FLYING SQUIRRELS



SENSITIVE SPECIES
Wildlife and Fish

Several species are limited in distribution and/or population numbers, and the interdisciplinary team determined that these species should be reviewed and existing information on their populations, habitats and sensitivity to human activities should be evaluated. An interagency task group was convened. This task group developed criteria for first identifying which species should be considered sensitive. The species identified were osprey (Pandion haliaetus), Peale's peregrine falcon (Falco peregrinus pealei), trumpeter swan (Cygnus buccinator), northern pike (Esox lucius), Fish Creek chum salmon (Oncorhynchus keta), King Salmon River and Wheeler Creek populations of king salmon (Oncorhynchus tshawytscha). Population and habitat information was then gathered for each species.

Right at press time for this document, the Regional Forester signed the Alaska Region Sensitive Species List. Eight species were listed. The eight are: Osprey, Peale's Peregrine Falcon, Trumpeter Swan, Dusky Canada Goose, Montague Island Vole, Fish Creek Chum Salmon, and King Salmon River and Wheeler Creek King Salmon.

The following summarizes the species that were considered that led to the eight that were selected for the Tongass National Forest.

Osprey

Four nesting pairs of osprey and eight nest sites have been documented in Southeast Alaska, all located in the Stikine Area (Hughes undated). Nest locations include Thomas Bay, Wrangell Narrows near Finger Point, and near the mouth of McCormick Creek on Wrangell Island. Ospreys have been observed at Towers Arm, Irish Lakes, and Kah Sheets on Kupreanof Island. Nest trees include broken-top spruce (live or dead) and western hemlock snags. All nest trees were located in the hemlock/spruce forest type and near streams or coastal beaches. Ospreys nest from late April through August and probably overwinter in Mexico and Central America. Historically, there is no evidence that there were more osprey in Southeast Alaska. The population numbers have remained stable but low. Limiting factors are unknown, but available nest sites and foraging areas do not appear to be limiting. The interagency task group did not recommend an intensive program of for increasing the osprey population because we do not understand the reasons why they have never been more abundant in Southeast Alaska.

Peale's
Peregrine Falcon

Thirty-six nests of Peale's peregrine falcon have been located in Southeast Alaska; 32 of which are on the Tongass National Forest. Nest surveys are very difficult to conduct, and biologists believe many more nests may be present. Peregrine nest distribution is closely associated with large sea bird colonies located on the outer coasts or nearby islands. The nest sites are on cliffs from 20 to 275 meters in height and all but one face the open ocean. Seabirds are thought to be major prey of the falcon. Information on falcon breeding biology or reproductive success is limited, but based on U.S. Fish and Wildlife Service surveys, populations do appear to be stable.

Trumpeter swans

Nineteen pairs of trumpeter swans occur on the Forest at Yakutat; an additional 13 nesting pairs are in the Chilkat Valley on non-National Forest lands. Surveys by the U.S. Fish and Wildlife Service indicate the Yakutat population has been stable, while the population in the Chilkat Valley has increased from 1 pair in 1975 to the current 13 pairs. Trumpeter swans winter in ice-free areas throughout Southeast Alaska; information on wintering habitats and populations is very limited. Numerous swans from other parts of Alaska migrate through Southeast Alaska, and many may be wintering in suitable habitats in Southeast.

Northern Pike

Northern pike are found in five lakes, referred to as Pike Lakes, about 23 miles east of Yakutat (Browning 1986). These lakes are shallow, with high concentrations of humic acid and peat-filled margins. The northern pike in Pike Lakes are the only natural-occurring pike in Southeast Alaska and are probably remnant populations that survived only because the most recent glacial advance missed the Pike Lakes area. Relatively little information is available on the life history and population dynamics for these pike populations.

Large Chum Salmon

Near Hyder on the Portland Canal, Fish Creek produces very large chum salmon, probably the largest chum salmon in North America. Several fish over 38 pounds have been weighed by biologists. Fish weighing 25 pounds are common. The average size is close to 20 pounds compared to 10 pounds for the average chum stock. A high percentage of the returning fish have spent 4 and 5 years in the ocean, accounting for large average size (S. Zemke, personal communication, U.S. Forest Service). Fish Creek is a low gradient stream, dominated by high quality spawning gravels and extensive areas of groundwater upwelling. The predominant upwelling and high quality spawning gravels appear to be the reasons for the remarkable production levels. The population appears to be stable.

Island Run King Salmon

King Salmon River and Wheeler Creek populations of king salmon are island genetic stocks. No other naturally-occurring runs of island king salmon stocks are known to exist in Southeast Alaska (S. Kessler, personal communication, U.S Forest Service). Information on these populations is limited. The king salmon stock serves as important king salmon transplant source for other streams and rivers.

PLANT SPECIES

Information on sensitive plants is very limited. Mary Muller of the U. S. Forest Service is recognized as the most knowledgeable person on sensitive plants for the Tongass National Forest. She compiled the following list of potential sensitive plants.

Plants are listed alphabetically according to scientific name, followed by the authority. Nomenclature in this list is based on Welsh (1974) and Hulten (1968). Information for each plant includes a very brief description of habitat and distribution. Local and regional endemics, disjuncts and range extensions are generally noted. Plants listed in the Notice of Review, Federal Register, September 27, 1985, are so noted, along with their category.

General types of sensitivity are listed below. Where applicable, the appropriate number follows a plant's description.

1. Range restricted to a few localities. The plant is considered rare even though it is found in large numbers at each locality.
2. Range is very large, but with few individuals.
3. Few individuals at one or several localities.
4. Plant is at the edge of its range, and may be common elsewhere.
5. Disjunct population.

Species

Androsace chamaejasme Host ssp. Lehmanniana (Spring.) Hulten
Alpine, heathlands, rocky sites in mountains. Specimen reported from Mt Calder needs to be verified. Possible range extension to the SE of about 500 miles. 4, 5.

Angelica arguta Nutt.
Streambanks, wet meadows. Specimen reported in Kakwan Point area of proposed Twin Lakes RNA on Stikine River needs to be verified. (W Alberta to Cal) seldom found W of Cascades. Could be A. LUCIDA or A. GENUFLEXA. If verified this would be a new species to Alaska. 4,5.

Arctostaphylos alpina (L.) Spreng
Alpine, heathlands, rocky sites in mountains. Specimen reported from Mt Calder needs to be verified. Possible range extension to the SE of about 500 miles. 4, 5.

Armeria maritima (Mull.) Willd. var. purpurea (Koch) Lawr.
Riverbanks, spits, heathlands, cliffs along sea. One SE AK collection, circumpolar. 5.

Arnica diversifolia Greene
Open forests. Rare in Ak, collection from interior Copper R. area. Specimen reported from Mt Calder needs to be verified. Range, Yukon to Cal. Taxonomic questions, may be of hybrid origin, possibly A. amplexicaulis & A. latifolia. 5.

Asplenium trichomanes L.
Crevices & rock outcrops. Rare in Ak, known in SE only. (Canada and lower states). 2,4.

Brasenia schreberi J.F. Gmel.
Aquatic, ponds. In AK, extreme SE (Gravina I.). Range extends S across S Canada and lower states. 4,5.

Calamagrostis crassiglumis Thurb.
Lake shores, coastal swampland. Only Alaska collection from Kodiak Island. Disjunctly south to California. Category 2 plant in 9/27/85 Federal Register. Proposed for listing as threatened or endangered. Further field study necessary to determine status. 1,2,4,5

Campanula scouleri Hook. ex DC.
Rock crevasses. Southern SE, rare. West coast endemic. 4,5.

Carex athrostachya Olney
Meadows, uncommon in Alaska, NE Southeast. Western states. 4,5.

Carex interior Bailey
Wet meadows. Northern SE. Occurs across North America. 4.

Carex lenticularis var. dolia (Carex plectocarpa Hermann)
Wet alpine areas. Mt. Roberts near Juneau, Glacier National Park, Montana. Category 2 plant in 9/27/85 Federal Register. Proposed for listing as threatened or endangered. Further field study necessary to determine status (Stanley, 1985). 3,5.

Cardamine angulata Hook.
Wet areas, forests. Extreme S Southeast. Range extends S to Cal. 4.

Cardamine pratensis L.
Heath to woodland, wet areas, streambanks. Circumpolar, southern edge of range in northern SE. Reported from Twin Lakes RNA, significant southern range extension. Specimen needs to be verified. 4.

Castilleja chrymactis Pennell
Beach meadows. Endemic of northern SE. Taxonomic questions to resolve, further surveys necessary. (Murray and Lipkin, 1987; Welch 1974)

Chimaphila umbellata (L.) Bart. var. occidentalis (Rydb.) Blake
Forest, forest edge. NE SE. Three Alaska collections; Beardslee Islands in Glacier Bay, Gold Creek near Juneau, Lynn Canal shore. Surveys needed to determine range. 4,5.

Cirsium edule Nutt.
Wet meadows, streamsides. Extreme SE SE, Hyder. Northwest endemic. 4,5.

Crataegus douglasii Lindl. var. douglasii
Forest. Southern SE, Hyder area and central Prince of Wales Island, disjunct population in PWS. (Across continent in scattered areas) 4,5

Cypripedium calceolus L. var. pubescens (Willd.) Correll
Open forests. NW SE. Circumpolar. Across continent E & S of Alaska.
2,4.

Cypripedium montanum Dougl.
Moist forests. Extreme N SE, possibly Stikine River valley. West coast endemic. Category 3C plant in 9/27/85 Federal Register. Withdrawn from consideration for federal listing, plant has proven to be more abundant than previously believed. 2,4,5.

Danthonia spicata (L.) Beauv. ex Roem. & Schult.
Dry areas. Extreme S SE, to be expected elsewhere. To south occurs across continent. 4,5.

Diapensia lapponica L. var. obovata F.Schmidt.
Rocky substrate, heathland. Common across Siberia through continental Alaska, disjunct population in northern SE. 4,5.

Draba lactea Adams
Heaths, mountains. Circumpolar. Specimen reported from Mt Calder needs to be verified. Possible range extension to the SW of about 200 miles. Not previously known from SE. 4,5.

Draba ventosa Gray var. ruaxes (Payson & St.John) C.L.Hitchcock
Ridges & slopes, high mountains. Only Ak collection, Mt. Crillon. Other sites: Glacier Peak, WN; Mt Waddington, BC. Taxonomically poorly understood, rarely collected. 2,3,4,5.

Category 3C plant in 9/27/85 Federal Register. Withdrawn from consideration for federal listing, plant has proven to be more abundant than previously believed.

Gentianella propinqua (Richards.) Gillett ssp. aleutica (Cham.& Schlecht.) B.Boi.
Meadows, subalpine. Mt. Roberts, Juneau, through Aleutians, endemic to these areas.
Category 3C plant in 9/27/85 Federal Register. Withdrawn from consideration for federal listing, plant has proven to be more abundant than previously believed.

Glyceria leptostachya Buckl.
Pond and lake margins. In Ak, known only from SE.SE. South to Cal.
Northwest endemic. 2,4,5.

Habenaria gracilis (Lindl.) Wats.
Wet meadows. In AK, known only from extreme S SE, endemic to this area and adjacent BC. Annette Island. Welsh, Calder & Taylor do not recognize the taxon, lump it into H. saccata Greene. Murray recommends further surveys and examination of specimens.

Habenaria orbiculata (Pursh) Torr.
Forests, In AK, known only from S SE. Range, northwest coast, and Great Lakes to Newfoundland. 2,4,5.

Habenaria unalascensis (Spreng.) S.Wats.
Meadows, muskegs, forests. In AK, scattered collections from Aleutians through SE. Range, west, with disjuncts near Great Lakes & Newfoundland.

Juncus articulatus L.
Emergent, pond and lake margins. In AK, rare, known only from west Chichagof area. Disjunct, with nearest known collections in S BC. Circumpolar at lower latitudes. 4,5.

Juncus nodosus L.
Marshes, hot springs. Scattered in interior AK, extreme S of SE. Range extends from Northwest east across continent. 4,5.

Lactuca biennis (Moench) Fern
Open forests, meadows. In AK, known only from Lynn Canal area. Otherwise range extends across continent. 4,5.

Lathyrus ochroleucus Hook.
Forests, thickets. In AK, known only from S SE (Hyder). 4,5.

Limosella aquatica L.
Mud banks, shallow water. Widely disjunct across southern AK. Not known from SE, but to be expected. Unverified report from Twin Lakes near mouth of Stikine River. Plant's small size may contribute to lack of collections. Range extends across continent, Eurasia. 5.

Listera convalarioides (Sw.) Nutt.
Moist sites along streams and lakes. In AK known only from the Aleutians. Unverified report from Twin Lakes near mouth of Stikine River.

Lupinus lepidus Pursh.
Dry slopes, open forests, gravel bars. In AK known only from extreme SE. West coast endemic. According to Welsh, probably introduced. 4,5.

Luzula campestris (L.) DC. var. congesta (Thuill.) E. Meyer
Grassy open areas, thickets, heath. In AK known only from S SE. Range extends through Northwest S to Cal. 4.

Mecodium wrightii (Bosch) Copeland 2
Moist rocks, tree trunks, wet maritime areas. In AK, known only from Biorka Island, Petersburg; also, few collections in coastal BC. Could be overlooked because of mossy appearance. Otherwise only known from Japan and Korea. 1,4,5.

Melica subulata (Griseb.) Scribn.
Meadows and forests. Aleutians, and in extreme SE (Warren-Maurell Islands and Suemez Island on southern point between Cape Islands, 3 collections). To be expected elsewhere in SE. Range extends S, to W part of continent. 4,5.

Mitella nuda L.
Moist forests, along streams, bogs. In AK known only from NE SE. Across Canada and northern US, Asia. 4.

Mitella trifida Grah.
Moist forest. In AK, known only from NE SE (Chilkat). S to California and Montana, endemic. 4,5.

Monotropa uniflora L.
Moist forest. In AK, known only from extreme SE. Range extends S to Cal, east to Atlantic. Scattered across Asia. 4

Nymphaea tetragona Georgi ssp. leibergii (Morong) Porsild
Aquatic, lakes and ponds. In AK, known from Cook Inlet area, interior and central SE. Possibly extinct in Washington State. Range, scattered across North America, and Eurasia.Central SE. 5.

Penstemon serrulatus Menzies ex Rees
Moist sites. In AK, known only from extreme SE. Hyder. Endemic to Northwest. 4.

Phacelia mollis Macbr.
Sandy, gravelly soils, rock outcrops, open woods. Central eastern AK, S to Haines, Skagway. Endemic to AK and Yukon. 1

Poa laxiflora Buckl.
Upper beach meadows. In AK, known only from S. Admiralty Island, Sandborn Canal, Cape Fox Springs. Endemic to northwest coast. Rare. Category 3C plant in 9/27/85 Federal Register. Withdrawn from consideration for federal listing, plant has proven to be more abundant than previously believed. Listed as sensitive in Washington. 1,2,4.

Poa merrilliana Hitchc.
Known only from Hubbard Glacier area. Doubtful species, probably should be placed with P. leptocoma (Welsh, 1974). Category 2 plant in 9/27/85 Federal Register. Proposed for listing as threatened or endangered. Further field and taxonomic study necessary to determine status.

Poa norbergii Hult.
Known only from Hoonah area. Doubtful species, probably should be placed with P. macrocalyx (Welsh, 1974). Category 2 plant in 9/27/85 Federal Register. Proposed for listing as threatened or endangered. Further field and taxonomic study necessary to determine status.

Rhododendron camtschaticum Pall. ssp. camtschaticum
Heaths, subalpine forests. In AK, known range from Yakobi Island through Aleutians. Yakobi collections are an eastward disjunct of about 400 miles. Endemic of coastal arc running from Kamchatka through at least Yakobi Island. 2,4,5.

Rorippa obtusa (Nutt.) Britt.
Wet places, shores. In AK, (according to Hulten) Juneau area only. Otherwise range scatters across US. 5.

Saussurea angustifolia (Willd.) DC.
Moist meadows, open forests. In AK, N SE only. Yakutat ocean beaches, Red Barron Lk., Admiralty Island; Mount Roberts, near Juneau, Berg Mountain. 4.

Smilacina racemosa (L.) Desf.
Forests. In AK, extreme S only. Range extends S and across continent. 4.

Stachys mexicana Benth.
Moist forests. In AK, S SE only, Annette I, S Prince of Wales Island. Northwest coast endemic. 4.

Stellaria ruscifolia pallas ex Schlect.
Gravelly areas, streambanks. Yakutat, Hidden Glacier. Range extends E through Aleutians to NE Asia. 4,5.

Symphoricarpos albus (L.) Blake
Forest edges, thickets. In AK, Lynn Canal area only. To be expected elsewhere. Range extends disjunctly S across continent. 4,5.

Trifolium wormskjoldii Lehm.
Meadows, coastal dunes. In AK, extreme SE only. Range extends S to include W North America. 4.

Thlaspi arcticum Porsild
Well drained sites, alpine, sands and gravels. Extreme N SE. Widely separated sites in AK and Yukon. Rare. Single or few specimens at each site. Category 2 plant in 9/27/85 Federal Register. Proposed for listing as threatened or endangered.

Veronica wormskjoldii Roem.& Schult. var. stelleri (Pallas) Welsh
Heathlands, alpine meadows. In SE AK, known from Juneau area only, disjunct from Kenai Pen. Range extends W along Aleutians through islands S of Kamchatka Pen. 4,5.

Viola selkirkii Pursh
Moist areas, thickets. NE SE. Rare. Widely separated locations across AK. Disjunctly east to Atlantic. Eurasia. 5.

Viola sempervirens Greene
Forests. Extreme S SE. Northwest endemic. 4,5.

The degree for potential concern for each plant is not shown. A logic for listing and prioritizing a plant needs to be established. A considerable amount of further work is necessary to refine the list. This would include coordination with other agencies, specimen verification, literature searches, field surveys, and taxonomic studies.

DEMAND ASSESSMENT Not applicable

EXISTING DIRECTION Direction for the management of threatened, endangered, candidate and sensitive plants and animals is provided in the Endangered Species Act of 1973, as amended (1978, 1979, and 1982), and Section 2670 of the Forest Service Manual. A summary of this direction follows.

Section 2 of the Endangered Species Act declares that "...all Federal departments and agencies shall seek to conserve endangered species and threatened species and shall utilize their authorities in furtherance of the purposes of this Act." In section 5, the Secretary of Agriculture is directed to "establish and implement a program to conserve fish, wildlife, and plants," including federally listed species. Section 7 directs Federal departments and agencies to ensure that actions authorized, funded, or carried out by them are not likely to jeopardize the continued existence of any threatened or endangered species or result in the destruction or adverse modification of their critical habitats. Federal agencies also must consult with the Secretary of the Interior or the Secretary of Commerce whenever an action authorized by such agency is likely to affect a species listed as threatened or endangered or to affect its critical habitat. The act mandates conference with the appropriate Secretary whenever an action is likely to jeopardize the continued existence of any species proposed for listing as threatened or endangered, or whenever an action might result in destruction or adverse modification of critical habitat proposed for listing.

The Secretary of Agriculture's policy on fish and wildlife (Department Regulation 9500-4) directs the Forest Service to:

1. Manage "habitats for all existing native and desired non-native plants, fish and wildlife species in order to maintain at least viable populations of such species."
2. Conduct activities and programs "to assist in the identification and recovery of threatened and endangered plant and animal species."
3. Avoid actions "which may cause a species to become threatened or endangered."

Forest Service objectives for threatened and endangered species include: Manage National Forest System habitats and activities for threatened and endangered species to achieve recovery objectives so that special protection measures provided under the Endangered Species Act are no longer necessary. Promote recovery efforts through Research and State and Private Forestry programs.

Forest Service objectives for sensitive species include:

1) Develop and implement management practices to ensure that species do not become threatened or endangered because of Forest Service actions.
2) Maintain viable populations of all native and desired non-native wildlife, fish, and plant species in habitats distributed throughout their geographic range on National Forest System lands.
3) Develop and implement management objectives for populations and/or habitat of sensitive species.

Forest Service policy for threatened and endangered species includes:

1) Place top priority on conservation and recovery of endangered, threatened and proposed species and their habitats through relevant National Forest System, State and Private Forestry, and Research activities and programs.
2) Establish through the Forest Planning process objectives for habitat management and/or recovery of populations, in cooperation with States, the Fish and Wildlife Service (FWS), the National Marine Fisheries Service (NMFS), and other Federal agencies.
3) Through the biological evaluation process, review actions, and programs authorized, funded, or carried out by the Forest Service to determine their potential for effect on threatened and endangered species and species proposed for listing.
4) Avoid all adverse impacts on threatened and endangered species and their habitats except when it is possible to compensate adverse effects totally through alternatives identified in a biological opinion rendered by the FWS or NMFS; when an exemption has been granted under the Act, or when the FWS or NMFS biological opinion recognizes an incidental taking. Avoid adverse impacts on species proposed for listing during the conference period and while their Federal status is being determined.
5) Initiate consultation of conference with the FWS or NMFS when the Forest Service determines that proposed activities may have an adverse effect on threatened, endangered, or proposed species.
6) Identify and prescribe measures to prevent adverse modification or destruction of critical habitat and other habitats essential for the conservation of endangered, threatened, and proposed species. Protect individual organisms or populations from harm of harassment as appropriate.

Forest Service policy for sensitive species includes:

1) Assist States in achieving their goals for conservation of endemic species.
2) As part of the National Environmental Policy Act process, review programs and activities, through a biological evaluation, to determine their potential effect on sensitive species.
3) Avoid or minimize impacts to species whose viability has been identified as a concern.
4) If impacts cannot be avoided, analyze the significance of potential adverse effects on the population or its habitat within the area of concern and on the species as a whole. (The line officer, with project approval authority, makes the decision to allow or disallow impact, but the decision must not result in loss of species viability or create significant trends toward Federal listing.)
5) Establish management objectives in cooperation with the States when projects on National Forest System lands may have a significant effect on sensitive species population numbers or distributions. Establish objectives for Federal candidate species, in cooperation with the FWS or NMFS and the States.

RESULTS OF TLMP IMPLEMENTATION

The only federally listed threatened or endangered species are the eight species of whales, and two species of peregrine falcons which migrate through Southeast Alaska. At this point in time, biological assessments and consultations with the U.S. Fish and Wildlife Service and National Marine Fisheries Service have not indicated adverse impacts on these species or their habitats from Forest Service management activities. For many of the candidate and potential sensitive species, additional information is needed to understand the species habitat relationships and populations. From what is currently known, none of the species' populations or habitats appear to be jeopardized by current Forest Service management activities as long as careful coordination and consideration is given for the needs of the species.

In January 1989, Region 10 of the Forest Service established a process to identify sensitive species as well as establish a list of sensitive species for the Region. However, at this time the Regional Forester has not officially designated any sensitive species. In fall 1989, Region 10 of the Forest Service implemented a sensitive plant species challenge cost-share agreement with the Alaska Natural Heritage Program/The Nature Conservancy. Under this partnership agreement, the Alaska Natural Heritage Program will conduct an exhaustive inventory to identify plant species for consideration for sensitive species designation by the Regional Forester.

OPPORTUNITIES AND CONCERNS

Specific habitat and population goals and objectives need to be established for applicable species which utilize National Forest Land.

Management standards and guidelines for the species need to be developed which will guide management activities to help achieve long-term habitat and population goals and objectives.

More information is needed on the seasonal habitat requirements for all of these species; the seasons and habitats which are currently limiting factors for the populations need to be identified and understood.

More information is needed on their current population status, and their distribution throughout Southeast Alaska.

TIMBER

SUMMARY

Total Tongass Acres- 16,955,945 ac.
- Non Wilderness Designation- 11,486,522 ac.
- Existing Wilderness Designation- 5,469,423 ac.
- Total Forested Land Base- 10.013 million acres
  - Old-growth Forested Lands- 8.734 million acres
  - Young-growth Forested Lands- 1.279 million acres
- Commercial Forest Land Base- 5,726,638 ac.
  - Old-growth Commercial Forest Lands- 5,169,000 ac.
  - Young-growth Commercial Forest Lands- 557,638 ac.
  - Non-Wilderness-4,173,067 ac.
    - Old-growth- 3.676 million acres
    - Young-growth- .497 million acres
  - Existing Wilderness- 1,553,571 ac.
    - Old-growth- 1.493 million acres
    - Young-growht- .061 million acres
- Wilderness Lands meeting Tentatively Suitable Standards- 1,134,106 ac.
- Tentatively Suitable Land Base- 3,065,976 acres
  - In Riparian Soils- 147,360 ac. (all in riparian buffer)
  - In Riparian Buffers (100')- 376,829 ac.
  - In Eagle Nest Buffers (330' radius)- 18,000 ac.
  - Harvested Tentatively Suitable Lands- 500,000 ac. (approximate)
  - By Operability Class- total = 3,065,976 ac.
    - Normal- 2,150,572 ac.
    - Difficult- 673,667 ac.
    - Isolated- 224,679 ac.
    - Not Classified- 17,058 ac.
- Average Volume Offered for Long and Short-term Sales (1980-1989)- 435 MMBF
- Average Volume Offered for Short-term Sales (1980-1989)- 128 MMBF
- Average Volume Released for Long-term Sales (1980-1989)- 307 MMBF
- Average Volume Sold/Released for Long and Short-term Sales (1980-1989)- 409 MMBF
- Average Volume Sold for Short-Term Sales (1980-1989)- 101 MMBF
- Average Volume Harvested for Long and Short-term Sales (1980-1989)- 295 MMBF
- Average Volume Harvested for Short-term Sales (1980-1989)- 82
- Average Volume Harvested for Long-term Sales (1980-1989)- 213
- Average Volume Harvested from Native/Private Lands (1980-1989)- 255 MMBF
- Timber Supply from SE Alaska (Federal, Private, State- 1980-1989)- 610.9 MMBF
- Reforestation P&M and Trust Fund Accomplishments (1980-1989)- 807 ac.
- Reforestation and KV Targets Accomplishments (1980-1989)- 1411 ac.
- Timber Stand Improvement-P&M and Trust Fund Accomplishment (1980-1989)- 6303 ac
- Active Long-term Contracts and Volume Remaining as of October 1, 1988
  - Alaska Pulp Corporation- 2,668,681,000 Bd. Ft. Sawlog Volume
  - Ketchikan Pulp Company- 3,177,037,000 Bd. Ft. Sawlog and Utility Volume
  - Pacific Northern Timber- 0 Bd. Ft. , (Rate Redetermination Appeal Pending)
- Active Long-term Contracts Termination Dates
  - Alaska Pulp Corporation- June 6, 2011
  - Ketchikan Pulp Company- June 30, 2004
  - Pacific Northern Timber- December 31, 1981 (Rate Redetermination Appeal Pending)
- HR 987 Moratorium Area Proposal
  - Total Acres- 1,846,381 ac.
  - Total Forested land Base- 1,468,150
  - Total Commercial Forest Acres- 911,190
  - Total Tentatively Suitable Acres- 650,875 ac.

OVERVIEW

The Tongass National Forest contains 16,955,945 acres of public lands within its boundaries. Of the total, 5,726,638 acres are commercial forest lands (lands producing greater than 20 cu.ft. per acre of useable wood fiber and lands recently harvested) supporting a wide array of vegetative characteristics. A total of 1,553,571 acres of these forested lands in Southeast Alaska are contained within existing designated wilderness, while the remaining 4,173,067 acres may be considered for timber management activities.

Not all of the forested lands outside of wilderness designation are suitable for timber harvest activities, however, due to factors including terrain, soils, the likelihood of soil mass movement, and land withdrawals. The Tongass National Forest contains approximately 3,065,976 acres of tentatively suitable forested lands outside of wilderness designation that are the basis of the timber harvest land base. Of the 3,065,976 acres of tentatively suitable forested lands, approximately 500,000 acres have been harvested and are in various stages of regeneration. Harvest on the Tongass has been in progress since about 1909. Regenerated harvest areas in some of the earlier sites have timber stands that are approaching harvestable size again.

The majority of the harvest has taken place since the establishment of the long-term sale contracts in the Ketchikan, Wrangell/Petersburg, and Sitka areas of Southeast Alaska. Two of the original four long-term contracts (Ketchikan, Wrangell, Sitka and Juneau Unit Sales) are active today. The Ketchikan Unit (Ketchikan Pulp Company) and the Sitka Unit (Alaska Pulp Corporation) Sales are in operation while the Wrangell Unit Sale was completed after contract modification. The Juneau Unit Sale was sold to U.S. Champion Plywood but cancelled by mutual agreement between the operator and the Forest Service.

FORESTS OF SOUTHEAST ALASKA

In order to understand the forests of Southeast Alaska, a description of their composition is appropriate. Briefly summarizing the information displayed elsewhere in this document, the Tongass is part of the cool, very moist rain forest that extends along the Pacific coast from northern California to Cook Inlet, Alaska. The majority of the forested land is covered with stands of trees which have remained undisturbed for centuries. The elevations of the forested zone on the Tongass vary from sea level to 3,000 feet in the south, and from sea level to 2,500 feet further north.

In the southern part of the Tongass, the coastal forest consists mainly of western hemlock and Sitka spruce with a scattering of mountain hemlock, western redcedar, and Alaska-cedar. Red alder is common along streams, beach fringes, and on soils recently disturbed by logging and landslides. Black cottonwood grows on the floodplains of major rivers and recently deglaciated areas on the mainland. Subalpine fir and Pacific silver fir occur occasionally at the treeline and near sea level but are not abundant enough to be of commercial value. The same species, excluding redcedar, occur further north. (Frederick Sound is generally considered the northern limit of redcedar.) Black cottonwood is more extensive in the northern part of the Forest where it is found along several glacial outwash rivers.

Blueberries, huckleberry, copperbush, devil's club, and salal are the most common shrubs. Because of the high rainfall and resulting high humidity, mosses and lichens grow in great profusion on the ground, on fallen logs, on lower branches of trees, and in forest openings.

Vegetational variety is the spice of the Tongass National Forest. Grass-sedge meadows usually lie at low elevations, often along the coast. The Yakutat Forelands, a glacial outwash plain dissected by numerous stream channels, are an example. Vegetation in meadows such as the Yakutat Forelands consist mainly of grasses, sedges, and other herbaceous plants. Willow border many stream channels.

Interspersed thoroughout the Forest are muskeg, or bog plant communities dominated by sphagnum mosses and sedges, although they may also support low shrubs, forbs, and a few scattered hemlocks and lodgepole pines. Muskegs vary greatly in size from small pockets, where drainage has been retarded, to broad expanses such as portions of the Yakutat Forelands. Muskegs may even occur on fairly steep slopes. Soil underlying these muskegs is highly organic and ranges in depth from 1 1/2 to 40 feet. These openings create variety in the otherwise unbroken coastal forest and add to its value as wildlife habitat. Shrubs growing at the edge between the forest and muskeg provide habitat variety.

Occupying the region above the coastal forest, the alpine tundra usually lies above 2,500 to 3,000 feet and is separated from the forest by a subalpine or transition zone. Soils are generally thin. Snow remains in some of the glacial basins year-round, particularly on north-facing slopes. Resident plants have adapted to snowpack and wind abrasion by evolving low growth forms. Low mat-forming vegetation covers most of the tundra, and cushion-like plants occupy crevices on exposed rock outcrops.

Productive forests cover an estimated 5,726,638 acres of the Tongass National Forest; approximately 88 percent of these forested acres display old-growth conditions. The stands of coastal Alaska are often described as mature or overmature and include a mixture of log quality ranging from pulpwood to high quality sawtimber. Only 3,065,976 acres support stands which are considered tentatively suitable and have the potential for commercial timber harvest.

The species composition of timber stands on the Tongass varies by location topography, drainage, soil type, and stand history. Western hemlock and Sitka spruce stands account for 99 percent of the land capable of growing industrial wood in Southeast Alaska. The remaining one percent of the forest land supports western redcedar, Alaska-cedar, and cottonwood.

Western hemlock (Tsuga heterophylla) is the major timber stand component, growing on 58 percent of the total area capable of growing industrial wood products. It grows best in valley bottoms and on lower slopes.

Sitka spruce (Picea sitchensis), the second largest stand component, occurs throughout the Forest from sea level to timberline; however, it grows best on well-drained soils in valley bottoms and on lower elevation of mountain slopes. Sitka spruce stands cover 3.7 percent of lands capable of producing industrial wood products. Stands rated as hemlock-spruce (mixed conifer) stands inhabit 37.1 percent of the lands capable of growing industrial wood products.

The remaining timber in most stands, approximately one percent by acreage, is evenly divided between Western redcedar (Thuja plicata) and Alaska-cedar (Chamaecyprus nootkatensis). Concentrations of the two cedars generally, but not always, are an indicator of poorer forest productivity sites, resulting primarily from poor drainage.

Tree species of limited commercial value include red alder (Alnus rubra), shore pine (Pinus contorta var. contorta), and black cottonwood (Populus trichocarpa).

OLD-GROWTH STAND CHARACTERISTICS

For timber inventory purposes, old-growth was defined as timber stands with the majority of volume in trees more than 150 years old. Most of the forests in Southeast Alaska are comprised of old-growth stands. Of the 16.956 million acres within the Tongass National Forest, 5.727 million acres are forested with commercial forest land conditions. Approximately 90 percent of these acres display old-growth conditions. Approximately 3.676 million acres of old growth stands are contained in non-wilderness designation. This total accounts for 88 percent of the non-wilderness forested land base. Old growth contained within wilderness totals 1.493 million acres and is approximately 96 percent of the forested area land base.

Acres which are not included in the old-growth definition but are an important component of the old-growth forest ecosystem are the acres that contain non-commercial quality vegetative characteristics. These acres account for approximately 4.332 million acres of the Tongass. Of this total 82 percent or 3.565 million acres contain old-growth characteristics. Combined with the old-growth commercial forest lands in wilderness and non-wilderness designation, a total of 8.734 million acres are in an old-growth condition on the Tongass. This total equates to 52 percent of the forest total acreage or 87 percent of the forested land base.

Old-growth stands vary widely in structure and species composition. Most of the timber volume is in trees over 20 inches in diameter, with more than 10 percent of the trees over 40 inches. Approximately 60 percent of the mature trees are western hemlock, 33 percent Sitka spruce, and the remaining 7 percent cedar and other species (Hutchison, 1967).

Age is the key factor in the development and present condition of old-growth stands. The majority of stands are in a decadent condition due to insects, disease, and other natural conditions. Based on the remeasurement data of the 1970's inventory it is generally accepted that growth of old-growth stands is offset by mortality (Hutchison and LaBau 1975).

The majority of old-growth stands are uneven-aged containing a wide range of tree sizes, from seedlings and saplings to occasional trees over 8 feet in diameter and 200 feet tall. Live trees decay increasingly with age. Stands with over 40 percent of their wood volume unusable for sawtimber are common.

Some even-aged stands of old growth are still thrifty and adding net growth. These stands range in age from 150 to over 300 years. They are considered to be in a preclimax successional status, containing little defect, with higher than average percentages of Sitka spruce. Many of these even-aged stands result from natural events such as windthrow and landslides.

The amount of acreage having old-growth characteristics on the Tongass National Forest has been estimated in each of the forest inventories. Table 3-121 provides a comparison of inventoried old-growth acres.

TABLE 3-121

INVENTORIED OLD-GROWTH ACRES IN PRODUCTIVE FOREST LAND (Thousands of Acres)

Category	Original Inventory (1950)	First Reinventory (1970)	TLMP Inventory (1977)	Second Reinventory (1980) 1/	Revision Inventory (1989)
Wilderness or			1,660	-	1,553
Reserved Forest Land					
Old Growth	34	N/A	1,595	-	1,493
Young Growth	0	N/A	65	-	61
Available Forest Land					
Old Growth	4,097	5,681	4,076	3,720	3,676
Young Growth	424	428	337	458	497
Total Forested Land	4,555	6,109	5,736	4,178	5,727
% Old Growth	91	93	93	90	90
% Young Growth	9	7	7	10	10

Source: R10, Timber Management November 17, 1989 and Revision Database, 9/15/89

1/- Non-Wilderness lands only. Wilderness was not inventoried.

FOREST INVENTORIES

The first timber inventory for all of Southeast Alaska began in 1953 and was completed in 1958. Due to the extensive area to be covered, the inventory was subdivided into working circles which included Juneau, Sitka, Petersburg, Yakutat, and Ketchikan. A portion of the original inventory was remeasured approximately ten years later to improve estimates of growth and mortality trends in young growth stands in Southeast Alaska (Hutchison and LaBau, 1975).

A complete reinventory program was started in 1970 to reevaluate the Southeast Alaska forest area and volume. Several new categories of information were collected, including data to evaluate level of stocking, volume strata classes, soil classifications, multiple use classifications, degree of slope, revised operability guides, and revised quality guides. Further, more detailed data were collected on the individual trees to better determine the management potential, such as risk class and soil microsite (Hutchinson and LaBau 1975). This inventory was completed in 1975.

In 1979, an extensive inventory consisting of a point sampling system gathered information across the Tongass to provide specific information for the completed 1970's forest inventory. The point sampling inventory which began in 1979 was completed for the Tongass Land Management Plan (TLMP). In the early '80's the 1979 point smpling inventory was redesigned on an administrative area basis. Field data collection for the second reinventory was completed in 1986. Table 3-122 displays a comparison of these inventories.

TABLE 3-122
COMPARISON OF FOREST INVENTORIES (Thousands of acres and Millions of Board Feet)

Area	Productive Forest Land Available Area (M Ac.)	Available Volume (MMBF)	Reserved Area (M Ac.)	Nonprod. Forest Area (M Ac.)	Nonforest Land Area (M Ac.)	Total Land Area (M Ac.)
Original Inventory - 1950's						
Chatham Area	1,611.3	45,791.3	5.5	2,070.1	3,353.8	7,040.7
Stikine Area	1,018.2	33,109.8		1,327.4	930.0	3,275.6
Ketchikan Area	1,891.5	63,163.4	28.2	2,297.3	1,310.1	5,527.1
Total Tongass	4,521.0	142,055.5	33.7	5,694.8	5,593.9	15,843.4
First Reinventory - 1970's						
Chatham Area	2,307.8	57,403.7		1,508.3	2,614.3	6,430.4
Stikine Area	1,280.1	29,397.0		943.0	769.4	2,992.5
Ketchikan Area	2,520.8	56,995.5		1,830.1	1,181.4	5,532.3
Total Tongass	6,108.7	143,796.2		4,281.4	4,565.1	14,955.2
Second Reinventory - 1980's 1/						
Chatham Area	1,418.8	32,100.0		908.4	2,190.7	4,517.9
Stikine Area	1,226.8	31,958.4		912.7	965.3	3,104.8
Ketchikan Area	1,536.6	37,534.4		1,799.2		
Total Tongass	4,178.2	101,592.8		3,620.3		

Source: Alaska's Forest Resources PNW 19, The Forest Ecosystem of Southeast Alaska PNW 34, USDA Forest Service Regional Office
1/- Non-Wilderness only. Wilderness was not inventoried.

TLMP TIMBER INVENTORY

An extensive vegetative inventory was required for the Tongass Land Management Plan (TLMP). Begun in 1977, a Landtype/Timber Task Force was formed to assess land base characteristics and timber supply qualities of the Tongass National Forest. For analysis, the Forest was divided into 867 major drainages. These drainages were designated Value Comparison Units (VCU's) and became the common areas for inventorying and interpreting resource values. The extensive TLMP inventory used a systematic point sampling technique to characterize each VCU. Approximately 210,000 points were analyzed, with each point representing about 80 acres of land. Using a standard grid, these same points were located on aerial photographs which delineated VCU boundaries. The points were analyzed through photo interpretation techniques and informally field checked to correlate inventory findings with actual field conditions (Landtype/Timber Task Force Working Report TLMP 3, 1978). A brief summary of the design and data collection follows:

1. A series of sample points were identified within the effective area of even numbered aerial photographs covering the Tongass National Forest. Depending on the scale of the photograph, there were either 20 or 24 points on each photograph.

2. The following information was determined for each point:
   a. Landtype - Homogeneous landforms with well defined patterns of soils and vegetative. These included eight classifications such as muskegs, valley bottoms, and alpine.
   b. Timber Land Classification - Basic timber classification for:
      - Commercial Forest Land (CFL) - Productive forested land
      - Noncommercial Forest Land (NCFL) - Nonproductive forested land
      - Nonforest (NF) - Lands not capable of being forested
   c. Other Decision Criteria - These criteria included approximately 50 attributes in addition to timber values, primarily wildlife and visual interpretations

3. The following timber related values were interpreted for each commercial forest land photo point:
   a. Forest Type - Predominant overstory tree species
   b. Size - The primary stand size class
   c. Volume per acre - Estimate of the net volume per acre class
   d. Site - Estimate of site index class
   e. Slope - The average percent slope class
   f. Soil Hazard - The degree of risk to soils from timber harvest
   g. Operability - Estimate of timber harvest operability

After the sample points for each VCU were coded, a computer file was created to store this information (commonly called the TLMP Points Data Base, 1979). The information could be summarized by VCU or by combination of VCU's. The computer summaries were used to provide data to the timber scheduling model, Timber RAM, which was an early predecessor to the current FORPLAN model.

The TLMP Points Data Base resulted in the compilation of the most definitive land type/timber information generated from the Tongass National Forest. This inventory generated the first uniform data of its kind for discrete subdivisions of the total forest land base.

The accuracy of the information was limited by lack of formal field verification and by some lack of uniformity in the interpretive skills of the people who compiled the information. The first factor was partially compensated for when the timber volume data from the 1970's inventory (which was field verified) was correlated with the new points data volume information. The second factor was kept to a minimum by timber staff personnel from the Forest Service Regional Office who periodically checked the administrative area personnel conducting the assessment (Landtype/Timber Task Force Working Report, TLMP3, 1978).

In 1985, the TLMP Points Data Base was updated to account for additional changes in the Tongass National Forest land base as a result of legislation. The Alaska Statehood Act of 1959 and the Alaska Native Claims Settlement Act of 1971 (ANCSA) authorized the transfer of federal lands in Alaska to the State of Alaska and Native Corporations respectively. In addition to selections, the Alaska National Interest Lands Conservation Act of 1980 (ANILCA) authorized the transfer of lands from Public Domain to the Tongass National Forest and finalized the Wilderness boundaries. The 1985 TLMP Amendment includes these updates.

REVISION TIMBER RESOURCE INVENTORY

One of the primary uses of the extensive forest inventory, required for each National Forest, is to provide current information for land management planning. The current inventories for the Tongass Land and Resource Management Plan

Revision were begun in 1982 and completed in 1986. These inventories were designed for each Administrative Area on the Tongass National Forest. All were based on the timber type map stratification using standard fifteen minute quadrangles. Over two hundred of these maps were required to cover the entire Tongass National Forest. The type maps were based on aerial photo interpretation. Prior to the 1980's Administative Area forest inventories, type maps were updated for ownership adjustments and timber harvest activities. Table 3-123 compares the timber resource inventories used for TLMP and the Revision.

GIS

To provide spatial data needed for the Revision, each type map discussed above has been incorporated in a Geographic Information System (GIS). Information and attributes available for the Forest include:

1. One hundred percent of the Tongass National Forest included in the landtype/timber type maps. These maps were digitized and included in the vegetative layer data structure.

2. Individual stand attributes in the GIS are:
   a. Cover Type - Identifies areas as forest or nonforest
   b. Nonforest Condition - Vegetative or landform condition of nonforested lands
   c. Nonstocked Condition - Current condition of nonstocked productive forest lands
   d. Productivity - Forest lands inventoried as being capable of producing 20 cu. ft./acre of useable timber volume, and low productivity due to alder, glacial activity, high elevation, low site index, muskeg, rock cover, recurring slide zone and willow.
   e. Forest Type - Forest type of productive forest lands
   f. Size Class - Average stand size class for productive forest lands
   g. Volume Class - Average timber volume class for productive forest lands

Note that the data in GIS is presented on individual polygons and not stands. Attributes associated with the individual polygons are a general condition of the area encompassed by the polygon boundary. The polygon boundary may encompass multiple stand conditions depending on the size of the area affected within the general condition of the polygon (e.g., small windthrown patches, second growth, ponds, muskeg or natural openings). In contrast, stands would encompass a vegetative characteristic of homogenous vegetative attributes throughout the area designated (e.g., regenerated harvest units). A plot within a stand would be expected to more closely resemble the attributes associated with the stand. It is logical to assume that plots within polygons would show a high variation when compared to results of the stand inventory. Analysis of the forest inventory has verified this assumption.

During the development of the timber type maps, aerial photo interpreters identifying the polygon attributes considered land type, water, rock, alpine, grass, non-forested condition, forest cover type, stocking, species composition, size class and volume class, to name a few. Some of the attributes such as stocking, species, and cover type were visually observable. However, attributes such as size class, volume class, and productivity were based on professional judgement and training of the photo interpreters since the attribute was not readily visible.

Data generated from the 1980's forest inventory plots was from a specific area around a given point within an identified polygon on the timber type maps.

Information gathered from the forest inventory was measured on-the-ground and is the basis for the growth and yield modeling. Information gathered for the forest inventory was site-specific and not a general condition of a polygon or stand.

The Forest Service compared individual forest inventory plot volume class results with the timber type map volume classes. The purpose of this analysis was to determine if lower volume classes contained old-growth forested conditions that were important sources of old-growth wildlife habitat. Not only was a large amount of old-growth found to be contained within the lower volume classes, but also a large variation in volume class determinations was found between the timber type maps and the measured forest inventory interpreted plots. The primary reasons for this variation are:

1. The timber type mapping assigned values for the polygon as-a-whole. The value of the polygon was based on the majority of the contents within its boundary. This meant that if the majority of the polygon was rated high volume and the forest inventory plot fell in a blowdown patch, or in the transition area between the high volume polygon and one of lesser volume, the resultant forest inventory volume would not be the same as that of the timber type map.

2. Few plots fell within the higher volume classes due to the lack of acres containing this forest type. Not enough plots fell within the designated high volume polygons to reliably conclude that a significant result of the forest inventory or timber type mapping were eroneous.

3. Old-growth forest conditions are naturally heterogeneous. Plots within these stands will show large variations due to the natural openings, second growth, multi-storied layering, variations in tree sizes, etc. One plot within a stand or polygon containing old-growth forest conditions can not be a representative sample of the entire polygon characteristics. In order to reliably determine the nature of each polygon, a thorough stand exam-type data gathering technique would be necessary.

Overall the timber type map is a good mapping tool, generated through close observation with aid of aerial photography, of all the Tongass timber type characteristics. The name given to the mapping, "landtype/timber inventory type map," describes the essence of this mapping tool . Volume class estimates were made to determine total acres-as-a-whole for the Tongass. Lines were drawn on the type maps to distinguish obvious changes in vegetative characteristics. Individual polygon attributes are relative to each other and are good sources of information when large land bases are being compared.

Like the timber type map, the 1980's forest inventory is a sound and statistically reliable source of information on the timber production potential and stand characteristics of the Tongass. The data gathered through the inventory process was designed to be statistically accurate on an administrative area basis. The original objective for the inventory was not to sample stands or polygons, but to sample the stratum to which the polygon belonged. Assignment of the polygon to one of the strata was based on the predominant forest condition within the polygon; the field sample sampled a specific location within the polygon.

During development of the Analysis of the Management Situation (AMS), volume class has become a center point of controversy, as it did during the

implementation of TLMP. Models for wildlife habitat and fish production utilizing volume class as a key to degrees of importance have sparked much debate both internally and externally. The debate is due to the importance of high volumes to both habitat and harvest, as well as to the visual and recreational resources. High volume has been portrayed as a key to identifying significant features of the forest in need of protection as well as in maintaining the allowable harvest.

The "volume class" attribute is assumed to be an easy representation of large diameter trees with large crowns, thus being interpreted as "old-growth conditions". However, when only keying in on the volume class attribute, other important attributes such as species composition, age, site index, soil type, trees per acre, basal area, slope, aspect, elevation, and understory characteristics are not being considered. "Volume class" has become a "label" of the type map polygons over the last ten years which does not necessarily tell us anything about the vegetative stand characteristics of the polygon itself.

Through the AMS, the Forest Service has begun a process of analyzing the GIS data base vegetative layer generated from the timber type maps to test a spatial mapping tool that will take selected attributes from the vegetative, soils and forest inventory into account when displaying timber types. Individual strata based on a combination of attributes in the vegetative and soils layers, rather than volume class alone, will be tested to better identify the vegetative characteristics of the forest. In doing so, volume class will be a product of the information available from the timber type map, forest inventory, and soils mapping layer, rather than an attribute assigned during the timber type mapping development. The product may decrease variances of actual on-the-ground vegetation to that of mapped vegetative characteristics found in the GIS data base and TLMP Revision analysis.

Presently the strata displayed in the AMS are defined by currently forested lands with volume class playing a key role in differences between strata. As analysis continues on the other attributes known to exist within the GIS data structure, the strata may take on a new definition and may very well drop any reference to volume class. Volume categorization may be generated from formulas derived from coefficients developed from the analysis.

What will be known for individual strata will be generated from the following list of attributes for three data sources:

1. Forest Inventory: Species, Plot Volume, Aspect, Slope, Basal Area, Plot Mean Diameter (DBH), Elevation, Trees Per Acre.
2. Timber Type Map: Administrative Area, Species, Size Class, Stocking, Volume Class, Decadence, VCU.
3. Soils Mapping: Site Class, Average Site Index, Soils Mapping Unit, Land Form Class, Slope, Aspect, Elevation.

Strata currently being displayed in the AMS referencing the vegetative layer are strata A,B,C, and D. All strata reference currently forested land conditions with volumes associated with the 8-20 Mbf/Acre, 20-30 MBF/Acre, 30-50 MBF/Acre, and 50+ MBF/Acre respectively (MBF = Thousand Board Feet). All attributes associated with the timber type map, with the exception of stocking and decadence, are maintained for each strata. This is consistent with the implementation of the TLMP whereby reference to the strata was by volume class 4, 5, 6, and 7 respectively.

As analysis continues, if a strong correlation exists between other attributes contained within the GIS data base and other sources, then the definition of strata will take new meaning and the number of strata may increase. This information will then be used in the GIS data base, and the Revision process will base further analysis on the new values.

Table 3-123 displays the relationship of the previous Forest planning databases to that of the GIS.

TABLE 3-123
COMPARISON OF TLMP INVENTORY WITH THE REVISION GIS INVENTORY

Category	Original 1977 1/ TLMP Inventory (M Acres)	Updated 1985 1,2/ TLMP Inventory (M Acres)	Revision 3/ Inventory (M Acres)
Total Tongass Land Area	15,189	16,707	16,956
Nonforest	5,705	7,300	7,331
Nonproductive Forest Land	3,792	3,671	3,384
Not Suitable Forested Lands or Lands Capable of being Forested (RTLMP)			948
Productive Forest Land			
Withdrawn/Wilderness	1,646	1,660	
Roadless (TLMP)	532	495	
Retention (TLMP)	273	273	
Withdrawn Forested lands in:			
Wilderness (RTLMP)			2,213
Research Natural Areas (RTLMP)			21
Expertimental Forests (RTLMP)			14
Available Forest Land			
Not Operable (TLMP)	917	978	
Operable Forest Land (TLMP)			
Not Scheduled (TLMP)	371	580	
Scheduled (TLMP)	1,953	1,750	
Tentatively Suitable (RTLMP) (Non-Wilderness)			3,066

Source: 1/ TLMP Points Database
2/ 1985 Tongass Land Management Plan Amendment
3/ Revision Database, 9/15/89.

TIMBER-RELATED ISSUES
HISTORICAL PERSPECTIVE

During the 1920's, the Forest Service began establishment of a pulp industry in Southeast Alaska. Early efforts were thwarted, primarily because of high costs, misfortunes and market declines. It was not until 1951 that the first successful sale was made. Soon after that, the Forest Service offered four long-term timber sale contracts. All four sale contracts were initially of 50-years duration and required pulp mill construction. Pulp mills were required of the operations due to the lower quality of Tongass timber, making it better suited to pulp manufacture. It was assumed that to attract the timber industry to Alaska, a long-term guaranteed supply of timber was necessary. To establish the industry, the Forest Service was committed to spending much more on Southeast Alaska timber sales than was netted by receipts from those sales (Backiel and Baldwin, 1987).

Two of these 50-year timber sale contracts are no longer operating (Table 3-73). The sale sold to US Plywood-Champion Paper was cancelled by mutual consent in 1976. The Pacific Northern Timber Company (PNT) ground activities were completed in 1981, however, the contract has not been closed due to a pending appeal by the purchaser on the redetermined rates for the last five-year period (R10, Timber Management, Contract Files). The remaining two contracts still operate on the Tongass. Holders of these contracts are the Ketchikan Pulp Company (KPC), a wholly-owned subsidiary of the Louisiana-Pacific Corporation, and the Alaska Pulp Corporation (APC), an American Corporation owned by Japanese interests. (Figure 3-39 shows the boundaries of these two remaining contracts.) As stipulated in their contracts, each company built a pulp mill, Ketchikan Pulp near Ketchikan and Alaska Pulp near Sitka. In return, the government guaranteed KPC and APC a total of about 13.3 billion board feet of timber over the 50-year periods. The Ketchikan Pulp Company's contract expires in 2004 and the Alaska Pulp Corporation's contract expires in 2011.

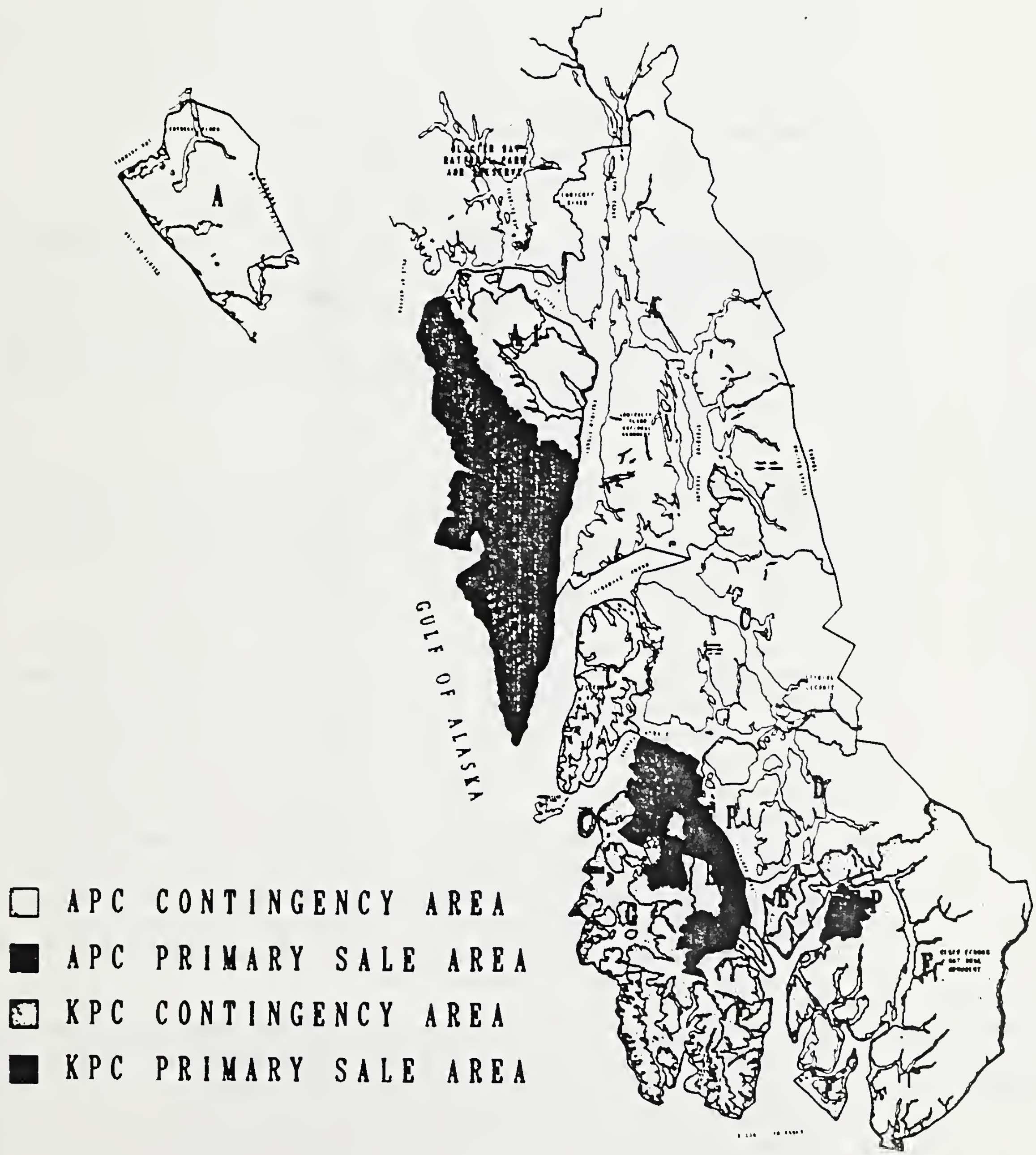
Table 3-124 displays the four original long-term timber sale contracts made on the Tongass National Forest after 1950. Displayed in the table is the original length of the contracts, date of execution, original volume, remaining volume as of October 1, 1988, and the contract termination date.

All four long-term sales were identified by the unit in which they were located. After the sales were sold, they began to carry the names of the operators rather than the units in which they were located. This has caused a great deal of confusion due the names of the companies operating the sales changing (e.g., Alaska Pulp Corporation used to be called the Alaska Lumber and Pulp Company; the Ketchikan Pulp Company used to be named the Louisiana Pacific Company).

U.S. Champion Plywood bought the Juneau Unit Sale, however, due to mutual agreement between the Forest Service and U.S. Champion Plywood, the sale was terminated before it became active. This was due to a trial in U.S. District Court that ruled in favor of U.S. Champion but was remanded back after further appeal by appellants to the 9th Circuit. The District Court failed to give a new ruling in sufficient time that would have made it possible for U.S. Champion Plywood to make a profitable venture out of the sale. U.S. Champion Plywood suggested the termination to the Forest Service.

FIGURE 3-39

APC, KPC LONG TERM SALE AREAS



MAP TM-1

DRAFT as of 12 Dec 89

TABLE 3-124
LONG-TERM TIMBER SALE CONTRACTS OF THE TONGASS NATIONAL FOREST

Unit	Ketchikan Unit	Sitka Unit	Wrangell Unit	Juneau Unit
Oerator(s)	KPC/LPK	APC/ALP	Alaska Wood Products/PNT	U.S. Champion Plywood
Length of Contracts	50 yr.	50 yr.	50 then reduced 25 yrs by RF	50 yr.
Contract Date	7/26/51	10/15/57	6/9/54	9/12/68
Original Volume (BF)	8,250,000,000 1/	4,974,700,000	693,107,000	8,750,000,000
Remaining Volume (BF) 10/01/88	3,177,037,000 (Sawlong & Utility)	2,668,681,000 (Sawlong Only)	-0-	-0-
Contract Termination	6/30/2004	6/30/2011	12/31/81 2/	terminated

Source: R10 Sales' Contract Files

1/ Original sale was for net sawlog volume only. In 1984 Utility volume was added to the contract.

2/ PNT Sale activities on-the-ground completed in 1981. Contract not closed at present due to appeal pending by purchaser concerning redetermined rates for the last five year period.

The Wrangell Unit sale was originally a 50-year contract. In the contract, conditions were agreed to with timeframes on the construction of 3 mills (lumber, pulp, and veneer). Only the lumber mill (Alaska Wood Products) was built. Due to this fact, the Forest Service decided to shorten the term of the contract from 50 to 25 years and decrease the amount of timber volume available.

With the signing of the long-term contracts, timber harvest on the Tongass shifted substantially. Prior to the early 1950's the average annual timber harvest on the Tongass was 45 million board feet per year. Most of this timber was cut in partial cuts along the coastal fringes of the mainland and island chains. Remnants of this early practice, primarily stumps under second growth canopies, are still visible today along nearly every coastline in Southeast. This practice primarily harvested large diameter spruce and clear hemlock sawtimber that dotted the shorelines. Harvest methods used boats and hand labor with an occasional A-frame yarder being used for longer yarding distances. Demand for this timber was generated from the need in the United States for airplane construction materials, best attained by the light-weight and structurally sound Sitka spruce, and by local production of fish traps where the Sitka spruce logs produced good flotation.

Since the signing of the long-term contracts in 1952, timber harvest has averaged approximately 352 MMBF per year. This volume has been generated primarily from the Ketchikan, Wrangell and Sitka Unit Sales. Table 3-125 and Figure 3-40 depict the annual harvest of sawlog and utility volume on the Tongass. Note the years 1954 and 1955 where timber harvest on the Tongass substantially increases. This is the result of timber harvest beginning on the Ketchikan Unit Sale. The Sitka Unit Sale began to show production in 1959 and 1960.

TABLE 3-125

TONGASS NATIONAL FOREST TIMBER HARVEST HISTORY BY CALENDAR YEAR [1/] 1909-1989 AND BY FISCAL YEAR (2/) FOR THE PERIOD 1952-1989 (SAWLOG AND UTILITY VOLUME

CALENDAR YEAR	TONGASS VOLUME	CALENDAR YEAR	TONGASS VOLUME	FISCAL YEAR	TONGASS VOLUME	HARVESTED ACRES BY FISCAL YEAR
1909		1952	63.4	1952	58.0	1460
		1953	59.2	1953	49.5	1340
to		1954	109.2	1954	66.8	1710
		1955	213.8	1955	179.3	4530
1916	234.5	1956	230.2	1956	215.8	5440
1917	41.0	1957	226.4	1957	253.6	7620
1918	43.1	1958	167.5	1958	195.7	6080
1919	37.4	1959	266.6	1959	218.3	4750
1920	45.6	1960	347.5	1960	314.8	8150
1921	11.7	1961	338.2	1961	347.4	10170
1922	20.6	1962	366.3	1962	339.2	8890
1923	40.5	1963	395.1	1963	180.5	5160
1924	48.6	1964	443.7	1964	415.7	11520
1925	53.7	1965	397.6	1965	424.6	11750
1926	51.0	1966	474.3	1966	439.6	10750
1927	52.0	1967	474.3	1967	450.5	11300
1928	33.8	1968	529.5	1968	541.3	13900
1929	42.0	1969	519.3	1969	518.7	13480
1930	38.5	1970	560.1	1970	493.0	10910
1931	18.2	1971	527.7	1971	584.2	17160
1932	14.7	1972	547.5	1972	532.4	13320
1933	14.7	1973	588.5	1973	590.7	14850
1934	28.2	1974	544.0	1974	559.6	14190
1935	30.5	1975	408.4	1975	462.4	11660
1936	40.0	1976	462.8	1976	444.3	11210
				1976T	109.6	2770
1937	35.3	1977	447.3	1977	456.3	12450
1938	25.6	1978	398.7	1978	414.0	12770
1939	26.5	1979	453.2	1979	422.2	11180
1940	30.9	1980	452.1	1980	480.1	9040
1941	35.8	1981	385.7	1981	386.7	7910
1942	38.5	1982	344.9	1982	370.7	7610
1943	73.6	1983	251.2	1983	250.5	7850
1944	86.8	1984	249.8	1984	261.0	3830
1945	58.3	1985	265.3	1985	231.3	4590
1946	48.6	1986	271.6	1986	290.5	8267
1947	83.4	1987	351.5	1987	336.2	8606
1948	81.0	1988	407.7	1988	396.2	9677
1949	49.2	1989		1989	443.1	14364
1950	54.4	1990	----	1990	----	----
1951	52.9	1991	----	1991	----	----

	CALENDAR YEAR 1906-88	FISCAL YEAR 1952-1989
TOTAL HARVEST:	14,230.4 (MMBF)	13,724.3 (MMBF)
AVERAGE YEARLY HARVEST:	194.9 (MMBF)	351.9 (MMBF)
AVERAGE ACRES/YEAR HARVESTED:		9,031 (ACRES)

Source: Timber Management, Region 10, October 3, 1989

1/-Calendar Year = January 1-December 31.

2/ Fiscal Year = October 1-September 30

FIGURE 3-40

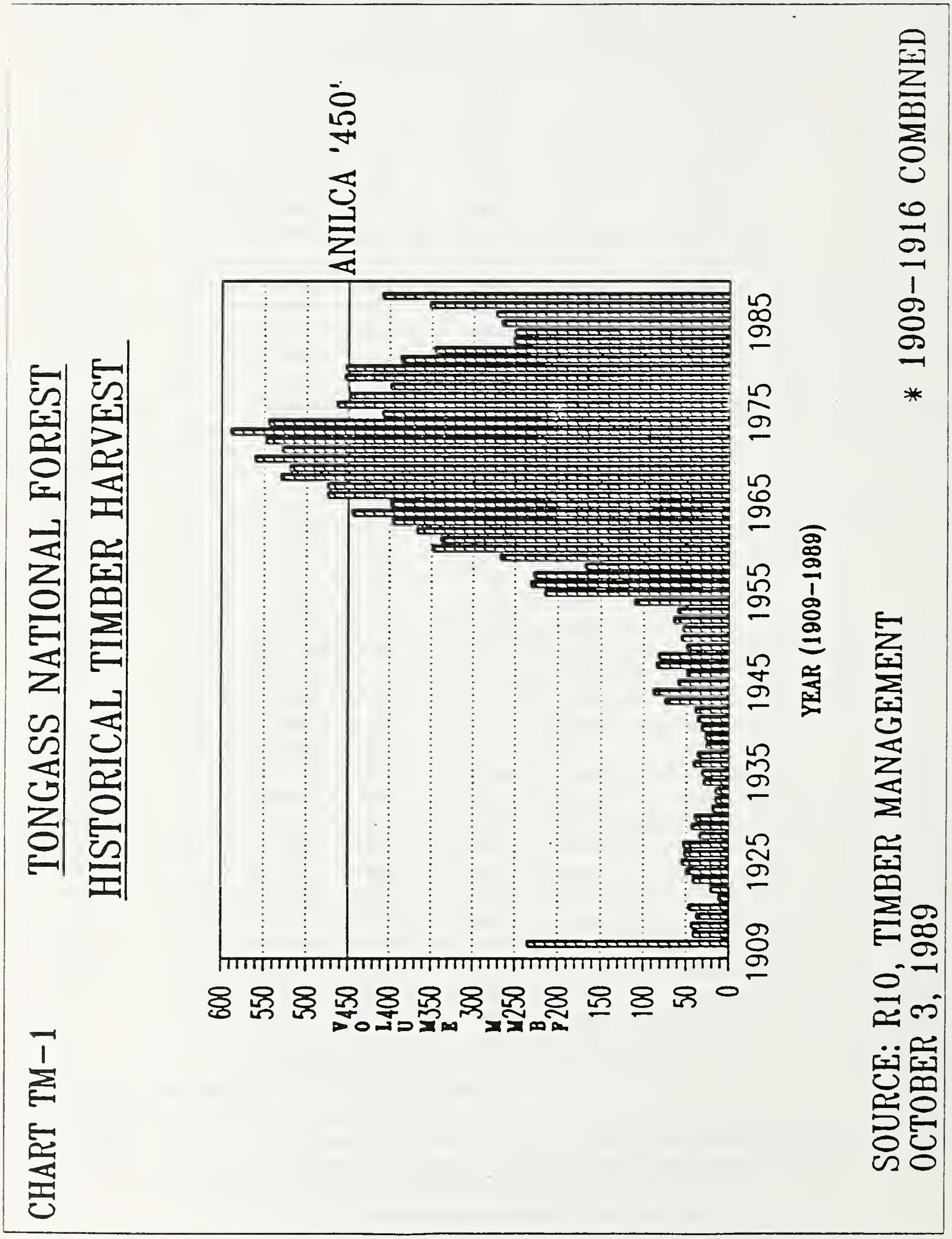


CHART TM-1
TONGASS NATIONAL FOREST
HISTORICAL TIMBER HARVEST
ANILCA '450'
VOLUME MMBF
600
550
500
450
400
350
300
250
200
150
100
50
0
1909
1925
1935
1945
1955
1965
1975
1985
YEAR (1909-1989)
SOURCE: R10, TIMBER MANAGEMENT
OCTOBER 3, 1989
* 1909-1916 COMBINED

Long-term sales make up about two-thirds of the timber volume available each year on the Tongass. Since fiscal year 1980, an annual average of 300 million board feet of net sawlog volume (a tree at least nine inches at breast height capable of producing a log twelve feet in length with a top diameter of six inches and greater than thirty-three and one third percent sound is considered to be a sawlog) has been made available to the long-term contracts. Of this, an annual average of 213 million board feet of timber has been harvested (see Table 3-77 in the "Timber Accomplishments" portion of this section). There is approximately fifteen percent additional utility log volume. Utility volume includes logs with less than one-third net sawlog volume but that contain at least one-half firm useable pulp chips. The Tongass Land Management Plan does not include utility logs or residual chips in the annual allowable sale quantity.

LEGISLATION AFFECTING THE MANAGEMENT OF TONGASS TIMBER

In the 1970's timber management and timber sales underwent a series of readjustments as a result of legislation which affected both the Forest Service and the timber industry. The National Environmental Policy Act of 1969 (NEPA) provided for interdisciplinary examination and review of any action that might affect the natural environment. The Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA) called for intensive planning and direction on National Forest lands. RPA was modified and clarified with the National Forest Management Act of 1976 (NFMA). These acts provided that management of the National Forests should involve interdisciplinary teams to ensure integrated land-management plans and revisions to overall plans every 15 years. Several provisions affected timber management activities. These provisions emphasized:

1. Nondeclining even flow (the amount of timber planned for any future decade must be equal to or greater than the amount planned for the preceding decade, and this planned sale and harvest for any decade is not greater than the long-term sustained yield).
2. Requirements that final harvests not take place until timber stands reach their culmination of growth.
3. Diversity of plant communities and tree species.
4. Protection of fish and wildlife habitat and visual resources.
5. Clearcutting was permitted only if it was the optimum silvicultural method and consistent with the objectives of the NFMA.

TLMP TIMBER OBJECTIVES

The Tongass Land Management Plan (TLMP) was a product of these Acts. Phase one of the planning process began in 1975 and resulted in completion of the Southeast Alaska Area Guide in April of 1977. The Area Guide provided direction for the Alaska Region and explained the Resources Planning Act assessment and program goals. It also contained a study plan that provided the basic direction for creation of TLMP.

The Tongass Land Management Plan was approved in March 1979. The planning goal for timber in TLMP was to make enough timber available from the Tongass to maintain current levels of timber-related employment within the context of the total timber available from other land ownerships. To accomplish this goal, the Tongass National Forest needed to make available an annual average of 450 million board feet of timber. At the same time, wilderness goals were to manage approximately 35 percent of the Forest as wilderness, including several large, nationally recognized areas, and a number of smaller areas representing the different landscape character types in Southeast Alaska. Other goals of the TLMP provided overall direction for the management of other important resources.

In order to establish 5.4 million acres of Wilderness on the Tongass National Forest and achieve the 450 million board foot average annual sale program (4.5

billion board feet per decade), additional funding was required. Records prior to the decisions reached in the Tongass Land Management Plan indicate that the average volume harvested was approximately 338 million board feet. At the time that the Tongass Land Management Plan was developed, this volume was thought to be economical under the prevailing 1978 budget allocations. To achieve an annual goal of 450 million board feet, the remaining 112 million board feet would have to be obtained through intensive timber management or from the harvest of uneconomic timber and/or harvest in environmentally sensitive areas. Table 3-126 displays the Forest Plan objectives and related funding estimates.

TABLE 3-126
TIMBER MANAGEMENT PROGRAM (Million Board Feet and Millions of Dollars)

	Average Annual Volume (MMBF)	Average Annual Cost ($MM)
Available Volume and Cost for:		
Normal Investments 1/	338	$14.8
Additional Investments 2/		
Preroading 2a/	60	$14.6
Precommercial Thinning (ACE) 2b/	34	$ 3.0
Advanced Logging Technology 2c/	18	$ 2.8
Total	450	$35.2
Adjustment for inflation 3/		$40.0

Source: 1. USDA Forest Service Status of the Tongass National Forest 1985 Report and 2. R10, Timber Management, November 31, 1989.

1/ Normal investments include sales similar to those economically viable during FY 1978.

2/ Additional investment sales are for marginal timber or access into environmentally sensitive areas and those that require intensive management. This funding was necessary to offset the timber base that was included in the 5.4 million acres of Wilderness designations where portions of the commercial forest lands were less economically and environmentally sensitive.

These additional investments were necessary to augment:

a. Preroading - construction of roads in advance of timber sales to offset the cost of access into marginal timber stands or increased road standards due to harvest in sensitive areas of LUD III designations.

b. Precommercial Thinning and the Allowable Cut Effect - Thinning young stands of timber to improve the spacing and species composition, increase growth, and shorten the time between harvest, thus allowing a higher rate of current timber harvest.

c. Advanced Logging Technology - Preparation of sales requiring logging systems not presently used on the Tongass National Forest and funding (loans) for new advanced logging systems.

3/ 1978 cost were adjusted by approximately 15 percent for inflation.

ANILCA

In Alaska, forest management has been influenced by the Alaska National Interest Lands Conservation Act of 1980 (ANILCA). This act, passed after the approval of the Tongass Land Management Plan, was a comprehensive Congressional treatment of Alaska land issues related to land claim disputes and management of Federal areas. Congress, through the passage of ANILCA, attempted to balance wilderness demands and the timber supply on the Tongass National Forest. The final legislation designated over 5.4 million acres of Wilderness. In order to offset the loss of the timber base through inclusion in Wilderness, a funding process was legislated to maintain a timber supply of 4.5 billion board feet per decade (450 million board foot average per year-essentially the annual timber target from TLMP) from the remaining available timber-producing land base (Status of the Tongass National Forest Report 1985, and R10, Timber Management, November 31, 1989).

The total timber management program in TLMP, when adjusted for inflation to 1980 dollars (see Table 3-75), constitutes the basis for the $40 million Tongass Timber Supply Fund (TTSF) and the 450 million board foot average annual timber supply in ANILCA (ANILCA Legislative History 1980, TLMP Evaluation Report 1984, GAO Report on Timber Provision of ANILCA 1988). The Tongass National Forest timber accomplishments are reported jointly for TLMP and ANILCA.

ANSCA-NATIVE TIMBER

The following information was obtained from a paper by Gunnar Knapp, Institute of Social and Economic Research, University of Alaska, October 16, 1989. At present this publication is in draft form under review by the Forest Service's Pacific Northwest Research Station.

The 1971 Alaska Native Claims Settlement Act established thirteen Native corporations in Southeast Alaska. There are twelve "village" corporations and one "regional" corporation (Sealaska Corporation). The Native corporations were entitled to select approximately 550,000 acres of land from the Tongass National Forest, about 90 percent of which have been conveyed to date. Most of the land conveyances occurred during the years 1979 and 1980. Since that time land exchanges have taken place and conveyances continue to occur on small tracts adjacent to existing inholdings. These lands had an estimated standing timber volume of approximately 11 billion board feet. This volume equates roughly to about 10 percent of the timber volume available for harvest in Southeast Alaska.

Native timber harvests of recently conveyed lands began in 1979 shortly after the Native Corporations received title to the lands. Native timber harvests grew rapidly to almost 400 million board feet in FY 1987 (see Figure 3-5 in the "Timber Accomplishments" portion of this section). Since 1983, more than half of the timber harvests in Southeast Alaska have occurred on Native lands. Many of the corporations have now harvested most of their merchantable timber, and Native corporation harvests are expected to decline significantly from the levels of recent years.

Native harvests are an important consideration in projecting future demand for Tongass National Forest timber. The growth in Native timber harvests contributed to a decline in Tongass National Forest timber harvests during the period 1982-1985 (see Figure 3-6 in the "Timber Accomplishments portion of this section). Considering decreased timber availability on Native lands due to harvest and the rise in market demand for Alaska wood products, the Forest Service expects the demand for Tongass timber to increase as Native harvests decline in the future.

When the Alaska Native Claims Settlement Act passed, December 18, 1971, the U.S. government withdrew specific federal lands for the Native corporations to choose from. These withdrawal lands were mainly near Native villages; in instances where there wasn't enough available land near a village, the government set aside "deficiency lands" elsewhere for Native selection. The corporations chose lands for a variety of reasons, but mainly for their subsistence and other historic values and for their potential resource wealth.

The village corporations received surface rights only to about 22 million acres. The regional corporations received subsurface rights to the village lands. Each village corporation received lands according to its population, with the smallest villages (those with populations of less than 100) receiving about 69,000 acres each and the largest (those with populations of more than 600) about 161,000 acres each. Exceptions to this general rule were the corporations in Southeast Alaska, which received rights to 23,000 acres each, regardless of population.

Most of the remaining 16 million acres were divided among the regional corporations under a complicated formula based largely on land area within the region: those regions that were the largest in acreage got the most land, even if their populations were small. Six of the regional corporations received land under this formula, with the Doyon region in the Interior and the Arctic Slope region getting the largest shares. Regional corporation lands include both surface and subsurface rights.

Section 7(i) of ANCSA requires each regional corporation to distribute 70 percent of its net revenues from timber and mineral development among the twelve Alaska-based regional corporations (including the distribution corporation). This provision was included in the law on the grounds that some regions would be more resource-rich than others. Application of the revenue-sharing provision has been the subject of many disputes and several court battles. In 1982 a Settlement Agreement was adopted by the regional corporations clarifying procedures for 7(i) distributions. Village corporations are not required to share their timber revenues with other corporations.

Section 22(k) of ANCSA required that for a period of five years, any sale of timber from lands selected under the act be "subject to the same restrictions relating to the export of timber from the United States as are applicable to national forest lands in Alaska." This section also required that for a period of twelve years, these lands be "managed under the principle of sustained yield and under management practices for protection and enhancement of environmental quality no less stringent than such management practices on adjacent national forest lands."

For a variety of reasons, enforcement of Section 22(k) of ANSCA was never attempted. Responsibility for interpreting or enforcing this provision was not clearly assigned by ANCSA. The Native corporations did not begin to receive conveyance to substantial areas of forest land until 1979, eight years after the passage of ANCSA, and large-scale timber harvest did not begin until several years later. The corporations and most agencies with potential responsibility for enforcement interpreted the time period referred to in the 22(k) provisions as dating from the passage of ANCSA.

Under the Alaska Native Claims Settlement Act (ANCSA), Congress created one regional corporation for Southeast Alaska, Sealaska Corporation. Alaska Natives

enrolled in Sealaska represent approximately 21 percent of total Alaska Native enrollment. ANCSA also created ten village corporations and two urban corporations (for Juneau and Sitka) in Southeast Alaska. Almost all lands selected by these corporations were in the Tongass National Forest. Land selections for seven of the village corporations are located near the villages, as provided for under ANSCA. However, land selections for five of the village corporations (Goldbelt, Shee-Atika, Kootznoowoo, Klukwan, and Cape Fox) are at a considerable distance from the communities. This is due in part to restrictions within ANCSA as to where selections could take place as well as the provision of alternative selection areas off of Admiralty Island to resolve environmental disputes. In addition, a number of land trades have taken place between the Forest Service and Native village corporations subsequent to the original conveyances.

Estimates of timber volumes on Native lands vary substantially with the limited data the Forest Service acquired prior to land conveyances. Volume computed on these lands can be derived from the Timber Type Maps used in identifying strata acres for the Forest Inventory, and from the data collected from the Alaska Forest Inventory Unit (FIA). Neither data sources are statistically sound due to the plots of each source being subsets of the total areas for which the inventories were designed. Considering the two sources of information, the volume on the Native lands ranges from 10.9 billion board feet to approximately 8.4 billion board feet respectively prior to any harvest taking place. Sealaska lands accounted for approximately 44 percent of the total forest area and volume conveyed to Native Corporations.

The amount of economic timber volume located on Native timber lands varies with the ever changing market conditions. It is difficult to measure economic timber inventory for large areas in Southeast Alaska due to local conditions such as slope and access affecting economic operability of timber stands. These conditions are difficult to quantify using aerial photo inventory and require more expensive on-the-ground surveys. Another significant problem with available inventory data is that the ground and photo plot data developed for the Forest Service inventory analyses were not designed to provide accurate estimates of inventory for the relatively small areas destined to become Native Corporation lands, but rather for broader areas within the Tongass National Forest. The limited number of plots which happened to fall upon what were subsequently to become Native lands do not provide a basis for inventory estimates which are anywhere near as statistically reliable as for larger areas in the Tongass National Forest.

Native Corporations face less restrictive and expensive standards in harvesting and marketing timber than does the Forest Service. Unlike timber harvested from public lands, Native Corporation timber harvests may be exported as round logs. Native Corporations also face less stringent standards for road construction and retention of old-growth than does the Forest Service. By themselves, these factors might tend to increase the economic timber inventory of Native Corporation lands compared with similar timber stands on Federal lands.

These factors may be more than offset by the Forest Service's ability to offer timber with investments in the road access and log transportation facilities. The Forest Service utilization requirements result in greater volume removals from a given timber stand than Native Corporations would achieve, as high value logs are required to offset the harvest of logs which might not "pay their way" to the market.

The amount of timber removed from Native lands is not accurately known. There are no formal requirements for reporting of timber harvest by Native Corporations or other private landowners in Alaska. There are substantial inconsistencies in different estimate of Native harvests prepared by several public agencies.

In 1988, Native Corporation harvests were estimated based on U. S. Department of Commerce Alaska export and import data. Total Southeast and Southcentral Alaska harvests were estimated based on net exports of logs and net exports of other forest products (cants, pulp, and woodchips) multiplied by assumed ratios of log use per unit of production. Native Corporation harvests were assumed to be equal to estimated total harvests minus harvests from public lands. This methodology is more rigorous than earlier procedures for estimating Native timber harvests. However, it is dependent upon a number of assumptions about ratios of final production to log use and the domestic consumption of Alaska wood products. Other problems with estimates include: 1) for some years it was not possible to distinguish between Southeast and Southcentral Alaska Native Corporation timber harvests, and 2) the timing of exports may significantly lag behind the timing of harvests.

Estimates of harvest on Native lands suggest that approximately 2 billion board feet of timber were harvested between 1979 and 1988. Except for a slight decline in 1984, the level of timber harvests increased in every year to annual levels of nearly 400 MMBF in 1987 and 1988.

The major products produced on Native lands are hemlock, spruce and cedar logs. The primary market for these logs is Japan, with some shipments to Korea and China. Hemlock, Spruce and cedar logs accounted for approximately 51 percent, 36 percent and 8 percent respectively of all log exports from Alaska between 1980 and 1987, most of which were harvested from Native lands.

Unlike timber harvested from the Tongass National Forest, Native timber harvests have not been subject to the primary processing requirements. Whereas most sawtimber logs harvested from National Forest lands are cut into cants prior to export, most timber from Native lands is exported as "round" logs.

Although round log export is the most important market for Native timber, utility logs form an important component of timber harvest volume. The primary markets for utility logs are the two Southeast Alaska pulp mills. Depending upon market conditions, utility logs can represent as much as 30 percent or more of the volume of export logs from a given harvest area.

Although the general market conditions have affected all corporations, specific market conditions have varied widely between corporations, due to differences in species mix and grade, volumes of timber available for sale, depth in managment and corporate marketing expertise. Marketing is further complicated by a lack of local markets and inventories consisting of a mix of highly sought after old-growth timber as well as significant volumes of defective timber. For most corporations, volumes are too low to permit sorted shipments of different species or grades directly to customers in different locations overseas. During poor markets, corporations may have to significantly discount some grades of logs in order to sell other more valuable grades which are part of the same shipment. At other times, purchasers may pay more for lower-grade timber in order to have access to higher grade timber.

In 1980, the first year of significant harvests by Native Corporations, the two Southeast Alaska pulp mills in Sitka and Ketchikan provided a market for utility logs. Beginning in 1981, however, it became increasingly difficult for Native Corporations to sell utility logs, due to depressed markets. By 1982 many pulp quality logs on Native land were being left on site. In 1983 Southeast Alaska pulp mills began to import lower-cost logs from British Columbia, which further displaced Alaska's lower quality timber in local pulpwood markets. Not only were Native logs displaced by the British Columbia imports, but also the short term timber sale pulp grade logs on the Tongass National Forest. The length of time Canadian imports were showing significance in the Alaska timber industry was shortlived (1984-1986). These logs are no longer available and a product of a market anomaly caused by an excess of pulp grade logs in the Canadian market.

In contrast to the market for high quality timber, in which the Native Corporations had an advantage due to their exemption from primary processing requirements, Native Corporations could not compete effectively with pulp log supplies from federal lands. In 1985, Sealaska Corporation stated that the Forest Service's practice of offering an average of 450 million board feet of timber each year during periods of depressed timber markets had:

> ...compounded the difficulty faced by the Southeast Alaska ANCSA corporations in finding local markets for pulpwood and low-quality saw logs produced from their timberlands... and has had an adverse impact on the ANCSA corporations' efforts to...achieve reasonable prices for timber which does not meet export market standards. Market conditions can and have dramatically affected the utilization standards on these private lands... While private timberland owners have continued to work toward greater utilization of the low-quality timber on their lands, actions taken by the USFS in the management of the Tongass National Forest have continually worked to the detriment of these efforts. Actions taken related to waiver of primary manufacturing requirements, salvage sale management, waivers on contract requirements, imports of timber from Canada, high level of timber being put on the market during depressed conditions, and subsidy of operations through the use of the Tongass Timber Supply Fund have virtually assured that purchasers of Federal timber will have no need to purchase lower-quality timber from private timberland owners to supply manufacturing facilities in Southeast Alaska.

Forest Service estimates of Native Corporation harvests of export logs and pulp logs show that approximately 77 percent of the total Native timber harvest volume has been sold as export logs, while the remaining 23 percent has been sold as pulp logs. Pulp log sale declined relative to total sales during the depressed market of the mid-1980's.

The primary, if not overwhelming, factor in the timber harvest strategies of most village corporations was a need for cash. After years of waiting for conveyances to timber lands, many of the village corporations faced severe cash flow problems, because of factors such as litigation, unprofitable investments, and shareholder demand for dividends. A number of corporations made substantial timber harvesting investments, borrowing money with their timber as collateral. As a result, when timber prices declined sharply after 1980, many corporations had to continue harvesting or even increase harvests in order to meet debt payments. This supply response was described in several August 1985 articles in the Anchorage Daily News:

> "We thought we were at the top of the mountain" says Byron Mallot, president of Sealaska, recalling the optimism of five years ago. "In fact, we were at the edge of a cliff and we all walked off together." The value of export quality logs has dropped to less than half its 1980 level. Lower grade pulp logs, which often make up more than half the yield from an acre of forest, are not worth hauling off the hillsides. Several corporations have simply left pulp logs to rot on the ground.
>
> Despite the poor market, logging will continue. Many of the corporations are deeply in debt and can't afford to stop. Since 1980, six village corporations have borrowed more than $30 million to help finance roads, ports, heavy equipment and crew payrolls, according to corporate annual reports... Two banks now hold more than 60,000 acres of Native lands as collateral for loans...
>
> Back in 1980, it was thought that timber investments would begin to pay off in a few years, providing the cash for dividends promised to shareholders. Now the loans are coming due. For many of the corporations, the only way to pay the bills is to log...

Adding to the difficulties caused by declining timber markets were overly optimistic expectations about merchantable timber inventory. For many corporations, initial long-term planning and financial commitments for timber harvests were based on inaccurate inventory assessments.

In subsequent years the substantial timber harvesting losses in the period 1981-1985 became the basis for significant revenues to a number of village corporations in subsequent years through the sale of net operating losses. As a result of a provision of the 1986 Tax Reform Act, Alaska Native corporations were permitted to sell net operating losses (NOLs) until 1991. Each dollar of loss purchased by a profitable corporation could be used to reduce its taxes by between 34 and 46 cents. Up to 80 percent of the tax savings were returned to Native corporation in payment for NOLs. In effect, every dollar of loss could be worth between 24 and 36 cents to a Native corporation.

In 1986 and 1987, four Southeast Alaska Native corporations alone reported more than $600 million in losses from logging operations and stumpage sales. These included both "hard" losses on logging operations as well as "soft" losses or "timber depletion losses" due to decline in timber values from the time of conveyance. Many of the corporations undertook new appraisals which concluded that timber values at conveyance had been significantly undervalued in the original appraisals, thus increasing the magnitude of the "soft" losses.

As a result of the NOL sale provisions, Southeast Native village corporations sold a substantial share of their stumpage, primarily to Sealaska Timber Corporation, Koncor Forest Products Company, and Klukwan, Inc. These companies are now major owners of the remaining timber inventory on village lands in Southeast Alaska.

The opportunity to sell "soft" losses may have had a more significant effect on the rate of timber harvests, especially in the light of the anticipated ending of the NOL sale provisions by Congress. "Soft" losses, based on the difference between timber prices at conveyance and timber prices at the time of sale, could only be realized by actually harvesting timber or by selling stumpage in a lump-sum sale, without any retained interest or control over the timber.

Corporations which did not sell their stumpage may have accelerated timber harvests or harvested otherwise unprofitable timber in order to gain a "soft" NOL. Corporations which made lump-sum purchases of stumpage may have faced pressure to harvest to realize a return on their timber investments. Thus NOL sale provisions may have led to some acceleration of harvesting above rates which would otherwise have occurred in 1986 and 1987.

Whether planned or induced by the market conditions which left most corporations in financial problems, no village corporation has attempted to follow a "sustained yield" approach in its timber harvesting. Most of the village corporations will have harvested all of their merchantable timber within a ten-year period from when they began harvests, approximately one-tenth to one-twelfth the period of time needed to produce marketable volumes of timber on second growth stands in Southeast Alaska.

Robert Loescher, Sealaska senior vice president for resources, has stated that "no Native corporation in Southeast Alaska has enough acreage to manage on an economical sustained yield basis. In Southeast it takes 80 to 100 years for regrowth (normal timber rotation). Sealaska would have to hold its annual harvest to below 2500 acres, and village corporations to less than 200 acres annually, in order to maintain a sustained yield timber harvest practice." Individual village corporations had to cut timber at a much faster rate than would have been possible under sustained yield management in order to harvest enough volume to cover the high fixed costs of timber harvesting.

Another factor contributing to rapid rates of harvest by village corporations was a desire to create employment for shareholders. Providing jobs for shareholders is an important goal of many of the corporations.

As a result of these factors as well as political considerations, there was never an attempt to enforce the Section 22(k) provision of ANCSA, under which Native lands were to be "managed under the principle of sustained yield..." for a period of twelve years. Responsibility for interpreting or enforcing this provision was never assigned by ANCSA or in subsequent legislation.

There is a general consensus among industry observers that Native timber harvests will decline sharply in the 1990's, due to declining inventory. Nine of the twelve village corporations are likely to have cut nearly all of their economically operable timber by 1991, and will have very little future sale volumes. Only one village corporation is likely to be able to sustain harvests at current levels for more than eight years into the future. Thus a sharp and continuing decline in harvests from village corporation lands will occur over the next three years.

In contrast, Sealaska Corporation still has substantial volumes of timber and has stated that harvests can continue at current levels for 10-12 years if current market conditions continue. If timber prices decline, it is likely that Sealaska harvests would be lower, but they might be spread out over a longer period of time.

In sum, a "best guess" projection of future harvests if current market conditions continue is that Native harvests will decline sharply over the next three years as most village corporation harvests end, to between 150 and 250 million board feet per year. Harvests will then gradually decline further to between 100 and 150 million board feet per year until the late 1990's. After the 1990's, as

Sealaska's remaining volume is harvested, harvests will decline to a lower level, measured in the tens of millions of board feet.

Market conditions will play an important role in determining future harvest patterns. If prices continue at current high levels, short-term harvests from Sealaska and village lands will be higher, and the eventual decline in harvests will occur sooner. Alternatively, if market conditions decline, harvests will drop more sharply in the short-term but may continue at a lower level for a longer period of time.

Industry observers' projections of the outlook for Native timber harvests are consistent with the low estimate of remaining economic inventory on Native lands, which suggest that village corporations could harvest timber at an annual level of 250 million board feet for three years, and Sealaska could harvest timber at an annual level of 125 million board feet for 12 years. These estimates suggest that original conveyances of economic inventory, harvests to date, and other removals from inventory may have been similar to the assumptions used in developing the low estimate. This would imply that original economic inventory was about 4.9 billion board feet, and total harvests to date have been about 2.2 billion board feet.

TONGASS TIMBER SUPPLY FUND

Tongass National Forest expenditures in fiscal year 1980-1988 on the Tongass Timber Program are shown in Table 3-127. The table depicts expenditures for timber sale preparation, Forest Service roading program, investments in precommercial thinning, and the advanced logging program that is prescribed in the Forest Plan and in the ANILCA, Section 705(a) funding provision.

TONGASS NATIONAL FOREST TIMBER ACCOMPLISHMENT

An Allowable Sale Quantity (ASQ) of 4.5 billion board feet per decade from the Tongass National Forest was calculated in the Forest Plan. An allowable sale quantity is the maximum volume that may be scheduled during the plan period (10-15 years) to meet long-term production while providing for other resources. The Forest's ability to supply this volume has been verified, given land status changes, timber prepared to date, and the investments in intensive forestry such as precommercial thinning. Since 1980, the average annual volume of timber made available to industry has been 435 million board feet per year, of which 409 million board feet per year has been actually sold or released for the long-term sales. (Released timber refers to the long-term contract volume. When harvest units approved in the five year operating plan Final Environmental Impact Statement and Record of Decision are laid out, appraised and approved for harvest, volume is 'released' to the operator.) Tongass timber is considered available to industry when it has been offered for sale in short-term sales or units have been released to the operators in the long-term sales.

Table 3-128 and figures 3-41, 3-42 and 3-43 compare the amount of timber that has been made available, sold, and harvested for both short-term and long-term sales between fiscal years 1980-1989.

TABLE 3-127

INVESTMENTS IN TIMBER MANAGEMENT (Thousands of Dollars)

Program	FY1981 1/	FY1982	FY1983	FY1984	FY1985	FY1986	FY1987	FY1988	FY1989
Timber Research Program	150	1,401	1,654	1,674	2,044	2,044	2,413	1,724	1,800
Timber Sale Program	10,022	12,261	11,939	11,445	13,577	11,897	11,808	11,365	10,630
Timber Reforest-ation Program	359	762	842	684	439	162	89	0	35
Timber Stand Improvement	1,838	3,232	2,395	1,918	2,036	3,070	2,956	202	930
Facilities Const Program	1,870	7,344	2,177	3,681	2,282	1,561	1,526	28	0
Purchaser Road Credit Support	4,892	10,229	3,955	3,863	4,878	6,776	6,936	3,654	6,452
Forest Service Road Const. Prog.	4,034	8,890	15,171	15,987	14,678	15,481	12,705	6,162	6,812
Log Transfer Site Program	0	1,776	596	481	1,302	391	1,368	0	1,470
Tongass Plan Revision	0	0	0	0	0	0	102	1,825	1,755
General Administration	0	0	6,311	8,321	5,212	6,581	6,058	5,687	6,115
TOTAL	23,165	45,895	45,040	48,054	46,448 2/	47,963	45,961	38,995	35,999

Source: ANILCA 706(a) Draft 1988 Timber Supply and Demand Report
ANILCA 706(a) 1988 Timber Supply and Demand Report

1/ Enabling legislation (ANILCA) for the Tongass Timber Supply Program (TTSF) was enacted 12/02/80. Normal appropriations were used for fiscal year 1980.

2/ Does not include $4,624,000 unapportioned fiscal year 1988 appropriation authorization, nor the prior year unobligated carryover Tongass Timber Supply Fund balances.

TABLE 3-128

TIMBER VOLUME OFFERED, SOLD, AND HARVESTED FOR FISCAL YEARS 1980-1989 1/

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	Annual Average
					Short-term timber sales program						
New Volume Offered	176	151	115	184	178	136	84	98	82	78	128
Net Volume Sold	173	144	75	69	45	36	174	150	62	86	101
Volume Harvested	114	125	132	46	50	32	50	63	83	126	82
					Long-term timber sales program						
Volume Available	347	394	363	275	298	298	298	298	255	243	307
Volume Harvested	314	215	195	174	177	131	201	219	249	251	213
					Total Tongass timber sales program						
Volume Offered	523	545	478	459	476	434	382	396	337	322	435
Vol. Sold/Available	520	538	438	344	343	334	472	448	317	340	409
Volume Harvested	428	340	327	220	227	163	251	282	332	377	295

Source: USDA Forest Service Timber Supply and Demand Report, Report No. 8, August, 1989

1/ Net MBF Sawlog Volume

FIGURE 3-41

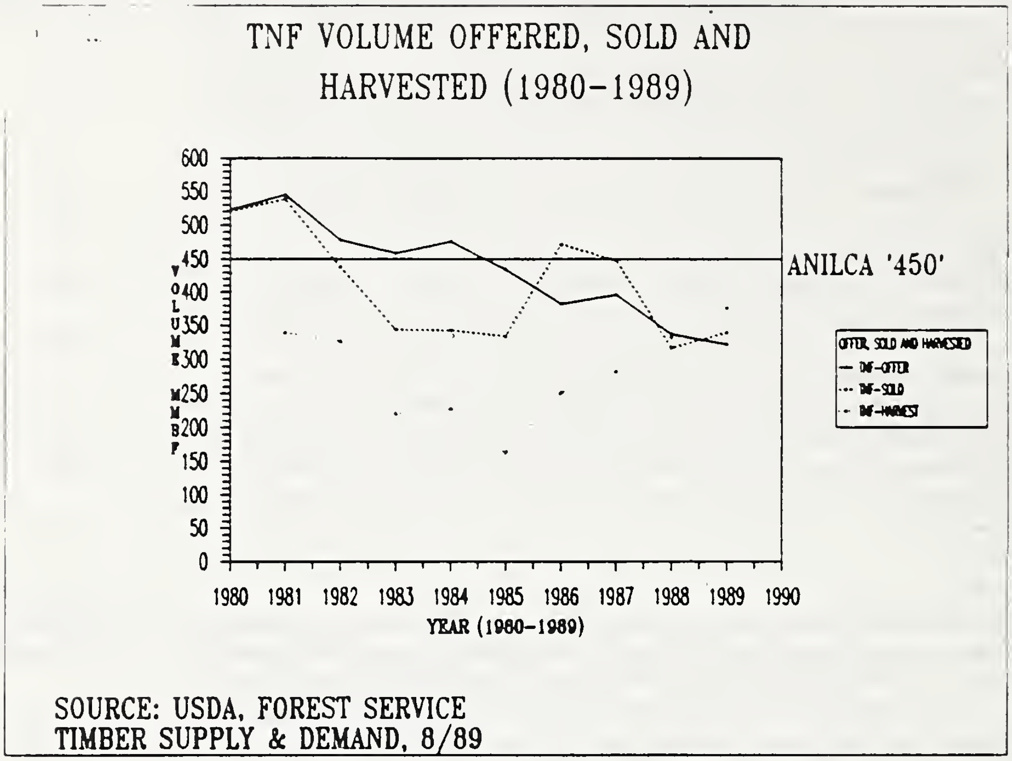
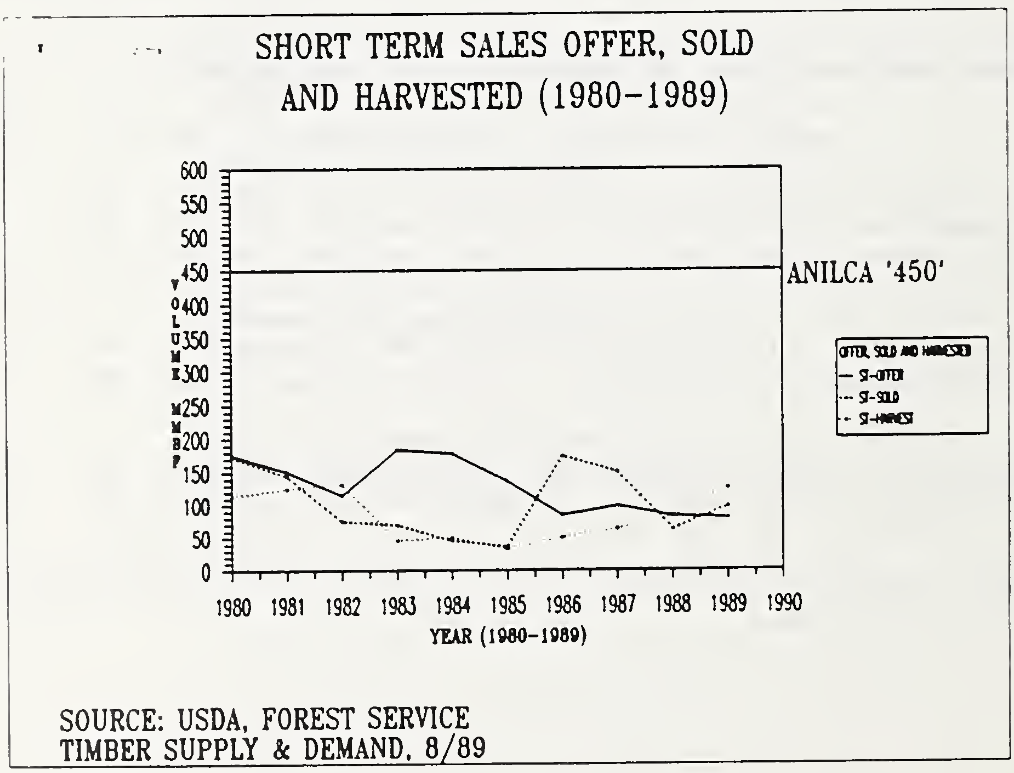


FIGURE 3-42



Between 1980-1988 the Tongass achieved all timber targets. Table 3-129 identifies yearly targets and accomplishments for the Tongass National Forest during the implementation phase of the TLMP. Due to the passage of the Alaska National Interest Lands Claim Acts (ANILCA) in December 1980, a shift of Tongass funding moved from P&M (Protection and Maintenance allocations) to TTSF (Tongass Timber Supply Fund). This funding shift is noted in the Table.

Table 3-129 depicts the Tongass National Forest's Timber targets versus accomplishments for the period 1980-1988. This period of time represents the implementation phase (period of time from signing of the TLMP Record of Decision through 1989) of the Tongass Land Management Plan.

An important element of the timber objectives in the Forest Plan are the TLMP volume class acres prescribed for harvest. Table 3-130 and figure 3-44 compare inventoried volume classes prescribed for harvest to inventoried volume class acres made available to industry, sold, and harvested between fiscal years 1980-1988. Figure 3-44 depicts the relationship of the Plan Goal acres to that of acres physically made available, sold/released and harvested. In volume class 20-30 MBF/acre the Plan Goal was surpassed slightly in the category of sold/released. The Plan Goal in the remaining categories was not met.

TABLE 3-130

AVERAGE ANNUAL ACCOMPLISHMENT BY VOLUME CLASS IN FISCAL YEARS 1980-1988 1/

Volume Class (MBF/Acre) 2/	Plan Goal 3/	Made Available 4/	Sold or Released 5/	Harvested
8-20	4.7 (100%)	2.7 (57%)	2.2 (47%)	0.7 (15%)
20-30	6.6 (100%)	6.9 (105%)	5.7 (86%)	3.0 (45%)
30-50	4.5 (100%)	3.7 (82%)	3.4 (58%)	2.7 (60%)
50 +	1.5 (100%)	1.2 (80%)	1.1 (73%)	0.8 (53%)
Total Acres	17.3 (100%)	14.5 (84%)	12.4 (72%)	7.2 (42%)
Total Volume 6/	450.0 (100%)	450.0 (100%)	400.0 (89%)	290.0 (66%)

Source: ANILCA 706(a) Draft 1988 Timber Supply and Demand Report1/ Thousands of Acres and Millions of Board Feet - Net

2/ Total acres under the plan goal include 970 acres per year from the allowable cut effect from precommercial thinning and 523 acres per year from advanced logging technologies. These 1,493 acres were not disaggregated by volume class in the original Forest Plan schedule, but have been estimated by amendments. The percent of acres made available, sold/released, and harvested are compared to the acres of each volume class in the plan goal.

3/ The acres made available include areas offered for sale in short-term sales or volume available for release in long-term sales. This is the ANILCA timber supply goal.

4/ The allowable sale quantity is measured when short-term sales are sold or long-term sale units have been released to the purchaser. This is the Forest Plan goal.

5/ Harvest quantity is shown for display purposes. It is not a monitoring or control standard since the scheduling and rate of harvest is controlled by the operator and is tied to the contract periods and not Forest Plan periods.

6/ Total volume rounded. For more detailed volume information see Table 3-77

TABLE 3-129

TIMBER TARGETS VS. ACCOMPLISHMENTS (1980-1989)

MARs 1/	Activity	FY 1980 2/	FY 1981 3/	FY 1982	FY 1983	FY 1984	FY 1985	FY 1986	FY 1987 4/	FY 1988 4/	FY 1989	1980-89 Average
	4/											
17.0	Timber Offer (MMBF)	524	520	475	475	475	451	379	383	348	306.4	433.6
	Offer Accomplished	539	545	478	459	476	432	382	408 8/	347 8/	317.5	438.4
	% Accomplished	102.9	104.8	100.6	96.6	100.2	95.8	100.8	106.5	99.7	104	100
	4/											
19.1	Reforestation (Acres)	820	1,224	900	1,941	1,017	355	140	865	0	0	726
	P&M and Trust fund Accomplishment 5,6/	446	0	0	0	0	0	0	1,066	0	0	
	TTSF Accomplishment7/	0	1,876	972	2,031	1,159	365	158	0	0	0	
	Total Accomplishment	446	1,876	972	2,031	1,159	365	158	1,066	0	0	807
	% Accomplished	54.4	153.3	108.0	104.6	114.0	102.8	112.8	123.2	0	0	111.1
	4/											
20.1	TSI Targets (Acres)	4,500	6,645	6,650	8,650	7,749	8,183	8,356	7,890	0	2,306	6,093
	P&M and Trust fund Accomplishment	4,364	0	0	0	0	0	0	0	0	0	
	TTSF Accomplishment	0	6,807	6,985	9,429	7,701	8,231	8,544	8,654	0	2,314	
	Total Accomplished	4,364	6,807	6,985	9,429	7,701	8,231	8,544	8,654	0	2,314	6,303
	% Accomplished	97.0	102.4	105.0	109.0	99.4	100.6	102.2	109.7	0	100.1	103.4
	4/											
19.2 20.2	Reforestation & KV Targets (Acres)	5,200	2,047	1,409	94	1,048	782	1,076	26	989	1,000	1,367
	Accomplishment	5,618	1,942	1,438	139	1,102	854	1,299	147	735	837	1,411
	% Accomplished	108.0	94.9	102.1	147.9	105.1	109.2	120.7	565.4	74.3	83.7	103.2

1/ MARs-Management Attainment Report. Annual report from each National Forest to the Washington Office showing Accomplishments.

2/ FY 1980- TTSF dollars not in effect. P&M and Trust Fund moneys allocated to the Tongass National Forest.

3/ Fy 1981-1980- TTSF dollars in effect as a result of the passage of ANILCA (December 2, 1980)

4/ Timber Offered, Reforestation, TSI, and KV targets from 1980-1986 were passed out to the Region by the Washington Office then divided out to the two Forests. From 1987-1989, specific targets were passed out to the Tongass by the W.O.

5/ P&M- Protection and Management Funds; appropriated dollars.

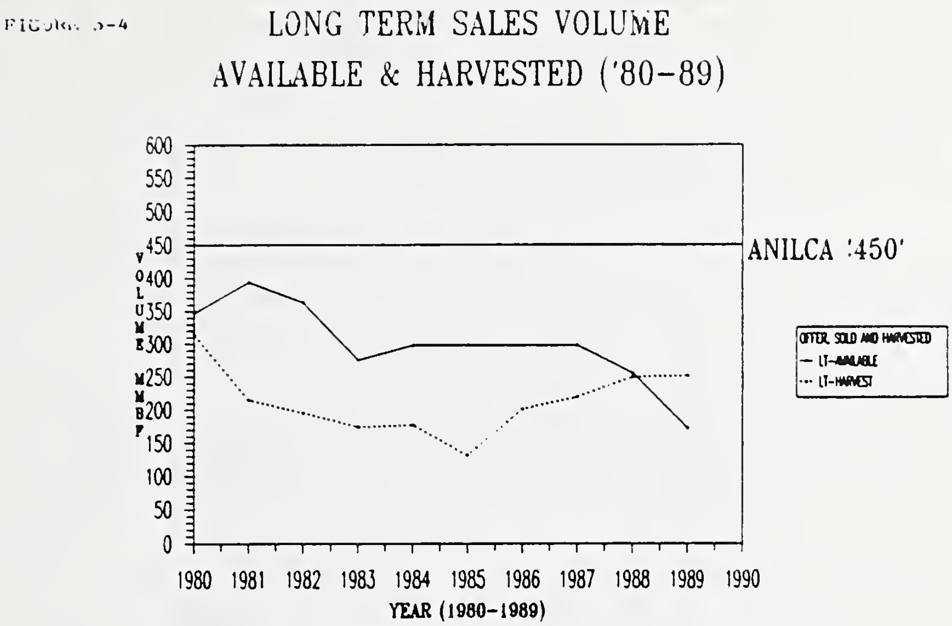
6/ Trust Fund - Special appropriations derived from tariffs on exported timber allowed to be used by the Sec. of Agriculture.

7/ TTSF - Tongass Timber Supply Fund established by the passage of ANILCA Section 705(a).

8/ 1987-88- Salvage Sale targets reported separately. 1987=12MMBF and 1988=10MMBF salvage volume included in total.

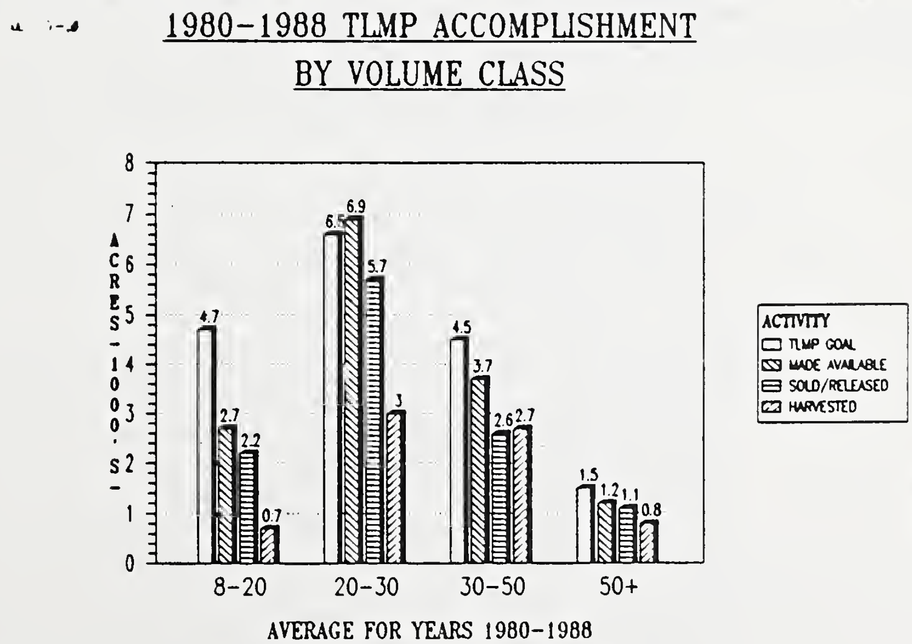
Source: Program, Planning and Budget, Region 10, June 23, 1989 and November 15, 1989.

FIGURE 3-43



SOURCE: USDA, FOREST SERVICE
TIMBER SUPPLY & DEMAND, 1/89

FIGURE 3-44



SOURCE:ANILCA 706a-DRAFT 1988

Timber sold and harvested falls short of the harvest anticipated in the Forest Plan. The Forest Plan estimates were made during a period of high inflation, rising interest rates, energy shortages, and extensive, but unknown, conveyances of Forest land to Native corporations and the State of Alaska. It is important to emphasize that the shortfall in harvest on the Tongass National Forest does not imply a diminished demand for Alaska forest products. Furthermore, the major United States policies which reduced harvest on the Tongass are not likely to be repeated. These policies included:

1. The extensive conveyance of public forested land to Native corporations and the State of Alaska is not likely to reoccur. These conveyances significantly changed the quantity of timber which could be offered from Southeast Alaska. Private harvest has increased from 22 percent in 1980 to almost 50 percent in 1988. Private timber supplies are expected to dwindle as the existing inventory is harvested.
2. The rapid rise in real interest rates in the United States between 1979 and 1981 helped combat rising inflation, but led to significant appreciation of United States currency abroad. The rapid appreciation of the dollar shifted demand in Southeast Alaska towards round logs harvested from private land and away from the primary manufacture required of Tongass timber. This tremendous appreciation of the United States dollar against the Japanese yen is not expected again in the near future.
3. With the tremendous buying power of the United States dollar, imports from the Pacific Rim grew at a rapid rate through 1986. The trade imbalance left Japan and the other industrializing nations of the Pacific Rim with huge dollar surpluses. With appreciation of the yen and the large reserves of dollars, the effective purchasing power of the Japanese has recently doubled. As private timber in Southeast Alaska is harvested, the producers will again look to the Tongass to supply value-added wood products.}

SUPPLY

THE LAND BASE

Tentatively Suitable Forest Land

Tentatively suitable forest lands are those identified as having the biological capacity and availability to produce industrial wood products. To be considered as tentatively suitable, the forested land must:

a. be at least 10 percent occupied by forest trees;
b. be capable of harvest with available technology to ensure timber production without irreversible resource damage to soils productivity or watershed conditions;
c. have a reasonable assurance that the area can be restocked after final harvest; and
d. not be withdrawn from timber production by an Act of Congress, the Secretary of Agriculture or the Chief of the Forest Service.

The Tongass Land Management Plan (TLMP) did not formally calculate tentatively suitable lands.. A special provision in the Alaska National Interest Lands Conservation Act (ANILCA) Section 705(d) stated that the National Forest Management Act's requirement (Section 6(k)) did not apply to the Tongass National Forest. Section 6(k) states that the Forest Service shall identify lands within the forest which are not suited for timber production, considering physical, economic and other pertinent factors to the extent feasible. No timber harvesting shall occur on non-suitable designated lands with the exception of salvage sales or sales necessitated to protect other multiple use values. The Forest Service shall review the non-suitable designation at least every ten years and return these lands to timber production whenever it is determined that conditions have changed so that they have become suitable for timber production. In fact, the National Forest Management Act's (NFMA) implementing regulations were not published until after the Tongass Land Management Plan was completed.

In practice, however, TLMP did designate productive forest as unavailable for timber harvest due to other multiple use needs. The special funding provisions of ANILCA Section 705(a) recognized that a portion of the timber supply would be used to make uneconomic timber more attractive by supplemental funding. Legislative history indicates that the actual intent of ANILCA Section 705(d) was to prevent impounding funds which would be used to implement TLMP (Backiel and Baldwin, 1987). The TLMP Revision will meet all requirements for suitability analysis. (See Appendix N for a detailed description of the process used to identify tentatively suitable lands for the TLMP Revision.)

There are 3,065,976 acres of tentatively suitable forest land on the Tongass. Designated Wilderness is not included in this base. The acres calculated as tentatively suitable are displayed in Table 3-131 and Figure 3-45. The tentatively suitable process utilizes the soils and vegetation layers from GIS to generate the suitable acre conditions. In process 1 of determining tentatively suitable acres, 388,000 acres were selected as being forested that were not so indicated by the soils layer in GIS. These acres have been included in the non-forested portion of Table 3-131 rather than being included in the forested condition class.

A contradiction will result in forested acres if only the vegetation layer is querried from the database. The vegetation layer displays 10.013 million acres as meeting conditions for forested categories. This total forested acreage is 388 thousand acres more than what is displayed in the tentatively suitable process.

Tentatively suitable lands inside most designated Wilderness are not capable of being determined through the tentatively suitable process developed for the GIS database, since most Wilderness lands do not have soils mapping completed and stored in the GIS. The soils and vegetative layers of the database are the components utilized to calculate tentatively suitable lands. Exceptions to wilderness not having soils data available are the Tebenkof and Petersburg Creek-Duncan Canal Wilderness areas of the Stikine Area. Both areas have soils mapping complete and in the database.

Tebenkof and Petersburg Creek-Duncan Canal Wilderness areas have approximately 70,526 acres of commercial forest land (CFL) contained within their boundaries. Of this total, approximately 52,235 acres are classified as tentatively suitable. This equates to 74 percent of CFL being tentatively suitable. The non-wilderness CFL portion of the Tongass contains 4,173,067 acres with 3,065,976 being classified as tentatively suitable. Non-wilderness tentatively suitable acres account for 73 percent of the non-wilderness CFL on the Tongass. If the percentage of tentatively suitable acres for all wilderness CFL is consistent with the percentage of tentatively suitable acres for non-wilderness CFL as is verified by the two wilderness areas on the Stikine Area, then approximately 1,134,106 acres of tentatively suitable lands are in wilderness designation.

The determination of lands actually suitable for timber production will begin in the Analysis of the Management Situation and culminate with the Forest Plan. Suitable lands in the Forest Plan will constitute the land base for determining the Allowable Sale Quantity and all vegetation management practices associated with timber production. The Analysis of the Management Situation and each alternative in the Forest Plan will be limited to only tentatively suitable acres.

TABLE 3-131
TENTATIVELY SUITABLE LAND CLASSIFICATION

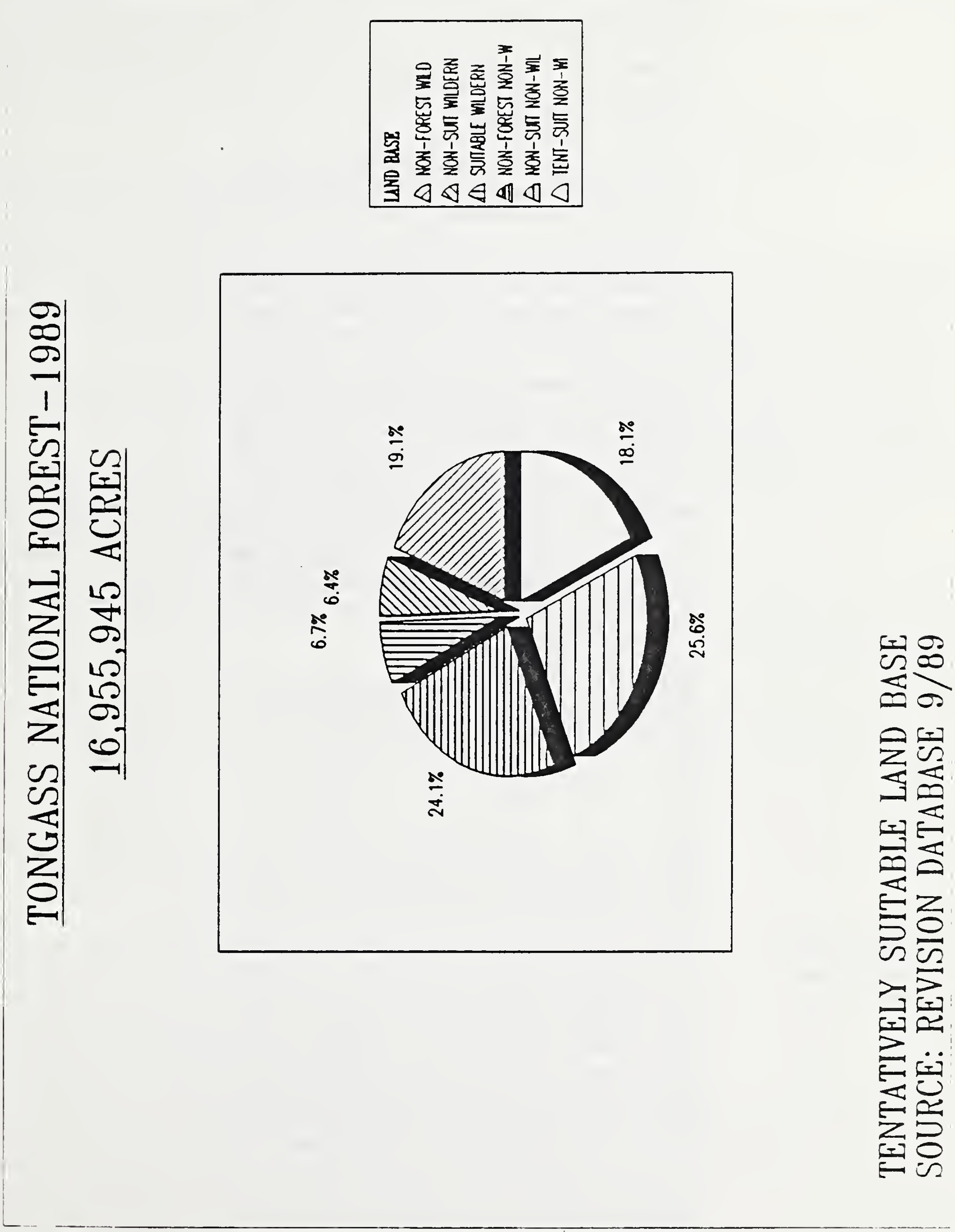
	Not Suitable for Timber Production (acres)	Totals (acres)
I. Total National Forest Area		16,955,945
II. Non-Forested Area		7,331,085 1/
Fresh Water (lakes, ponds, etc.)	267,649	
Saltwater (lagoons, inclusions)	77,352	
Developed for purposes other than timber production	14,451	
Roads	12,810	
Non-forest lands	6,958,823	
III. Forested Lands or Lands being Capable of being Forested		9,624,860 1/
Non-Forested lands capable of being forested	285,041	
Not capable of growing industrial wood products	48,501	
Irreversible damage likely to occur	850,678	
Regeneration difficulty	97,016	
Inadequate response information (Non-productive forest lands)	3,029,905	
Withdrawn forest lands		
Existing Wilderness	2,212,658 2/	
Existing Research Natural Areas	20,915 2/	
Existing Experimental Forest	14,170	
IV. Tentatively Suitable Forest land		3,065,976

Source: Revision Database, 9/15/89 Q31

1/ The tentatively suitable process utilizes the soils and vegetative layer of the GIS database. This combination of data sources accounts for 388 thousand acres less of forested lands than if the vegetative layer is selected only. Total forested land from the vegetation layer query is 10.013 million acres. The tentatively suitable process utilizes 9.625 million acres as the forested base.

2/ 13,867 acres of Research Natural Areas also occur in Wilderness. Total Research Natual Area acres are shown. Add 13,867 acres to the Wilderness designation to get total acreages.

FIGURE 3-45


TONGASS NATIONAL FOREST-1989
16,955,945 ACRES
LAND BASE
NON-FOREST WILD
NON-SUIT WILDERN
SUITABLE WILDERN
NON-FOREST NON-W
NON-SUIT NON-WIL
TENT-SUIT NON-WI
19.1%
18.1%
25.6%
24.1%
6.7%
6.4%
TENTATIVELY SUITABLE LAND BASE
SOURCE: REVISION DATABASE 9/89

THE POTENTIAL GROWTH MODELS

Improved growth and yield techniques were needed to allow land managers to select optimum timber production practices while protecting other resource values. In 1984, the Alaska Region requested that a variant of the Prognosis Growth and Yield Model be developed for the western hemlock - Sitka spruce forest type in Southeast Alaska. Prognosis is an individual tree, distance-independent growth and yield model which was developed for use in Idaho and Montana. Variants of the model have been calibrated for different geographic areas of the western United States (Stage,1979).

In 1987, the Southeast Alaska variant of Prognosis (SEAPROG) was developed by the Forest Service Mensuration and Systems Development Group in Ft. Collins, Colorado. Information was collected from many sources within the range of the western hemlock - Sitka spruce forest type, including the major portion of the Tongass National Forest, coastal British Columbia, the Queen Charlotte Islands, and the extreme northwestern tip of the Olympic Peninsula. Since Prognosis is an individual tree model, a wide variety of forest types can be accommodated, as can any stand structure ranging from even-aged to uneven-aged.

Although the model continues to be calibrated, it has been released to the Region and is being used to develop timber yield information for the Revision. (See Appendix O for a detailed listing of yield tables.)

The old-growth stand volume characteristics in Table 3-132 were developed for the Revision using the SEAPROG Growth and Yield Model to summarize existing conditions. Forest inventory information continues to support the premise used in the Forest Plan that growth equals mortality for old-growth stands. For this reason, old-growth yields will remain constant over time in the Revision calculations. Existing old-growth net merchantable volume per acre is shown in Table 3-132.

TABLE 3-132
REVISION YIELD ESTIMATES FOR OLD-GROWTH STANDS 1/

Strata	Stikine Area	Chatham Area	Ketchikan Area
A	22.0	14.6	16.9
B	27.4	23.1	29.4
C	30.2	30.5	29.3
D	40.9	35.9	36.0

Source: Revision planning records.
1/Net merchantable thousand board foot volume per acre.

GROWTH AND YIELD CALCULATIONS

Timber yield calculations for the Tongass Land Management Plan were based on the Forest Inventory completed in 1975. In application, existing old-growth volumes per acre were calculated for the Administrative Areas. The Chatham Area was further subdivided to account for specific yield estimates for Yakutat. Yield tables were developed for each volume class on the Tongass using weighted average volumes per acre from each of the three Areas and Yakutat. Using the assumption that growth of old-growth stands was offset by mortality (Hutchison and LaBau, 1975) the yield prediction is static over time. The inventory volume (16 foot Scribner) is converted to net scale volume (32 foot Scaling Bureau Scribner) in the final yield estimates. The conversion includes estimates of felling and yarding breakage, cull deductions, and volume table differences. Tongass Land Management Plan net per acre yield calculations are shown in Table 3-133.

TABLE 3-133
TONGASS LAND MANAGEMENT PLAN YIELD ESTIMATES FOR OLD-GROWTH STANDS 1/

Volume Class Range	Code	Yakutat MBF/Acre	Tongass MBF/Acre
0 - 8	3	5.7	6.9
8 - 20	4	10.3	13.1
20 - 30	5	22.0	23.7
30 - 50	6	32.6	36.0
50 +	7	47.0	47.6

Source: TLMP Planning Records
1/Net merchantable thousand board feet per acre

Second-growth yield tables for the Tongass Land Management Plan were adapted from published yield tables for young-growth hemlock-spruce stands in Southeast Alaska (Taylor, 1934). Although these tables were over 40 years old, they were the standard for predicting productivity of unmanaged young growth that follows harvesting of Southeast Alaska's overmature old-growth stands at the time. Yield tables were also estimated for managed young growth stands. Precommercial thinning (thinning stands usually less than 20 years old to improve species composition and number of trees) was projected to increase the average stem diameter and increase usable yield at the end of the rotation (Ruth and Harris, 1979). Tongass Land Management Plan second-growth yield tables for natural and managed stands are shown in Table 3-134.

TABLE 3-134
TLMP YIELD ESTIMATES FOR SECOND-GROWTH STANDS 1/

AGE	UNMANAGED YIELD TABLES SITE INDEX 80	90	100	110	120	MANAGED YIELD TABLES SITE INDEX 110	120
	-----Net Merchantable Scribner Thousand Board Feet Per Acre-----						
10	0.0	0.0	0.0	0.0	0.0	0.0	0.0
20	0.0	0.0	0.0	0.0	0.0	0.0	0.0
30	0.0	0.0	1.9	2.7	3.8	7.5	4.5
40	0.0	0.0	4.6	6.3	9.2	22.2	18.4
50	0.0	0.0	8.5	11.6	16.6	24.5	29.1
60	0.0	0.0	14.2	19.2	25.3	30.6	38.0
70	10.0	14.6	20.6	27.5	34.7	37.7	48.7
80	14.7	20.5	27.4	34.5	42.2	42.0	51.6
90	18.3	24.3	31.3	38.4	46.1	45.7	55.1
100	22.3	29.3	36.2	43.4	51.4	49.1	57.8
110	26.5	33.3	40.5	48.0	56.1	52.1	60.3
120	29.7	36.8	44.1	51.7	60.1	54.9	62.5
130	32.5	39.7	47.3	55.1	63.5	57.4	64.5
140	34.9	42.4	50.1	57.9	66.5	59.8	66.5
150	36.8	44.4	52.4	60.3	69.0	60.3	69.0

Source: TLMP Planning Records Updated for 1985-86.
1/Net merchantable thousand board foot volume per acre

The Revision Yield Tables were developed using the 1980's Forest Inventory data utilizing the SEAPROG program (R10, Timber Management, December 1, 1988). Output volumes were based on net live 32 foot scale for trees 9.0 inches and larger DBH. Yield tables were established for each of the three Administrative Areas where discrepancies in volume for the same treatments and site index is explained by greater diameter growth at lower latitudes, differences in species composition, and how the model selects trees to kill when composition is not controlled.

Shortfalls of the yield tables are that a low number of sample plots were taken in second growth and in the higher volume class stands which comprise the Tongass' vegetative composition. This resulted from a randomly selected set of sample points forest-wide where the majority of stands are in old-growth forest conditions and in lower volume class strata. Utilizing a larger data set for the ten-year starts on second growth would provide better precision in the starting number of trees per acre and species composition. The second growth tables will be used until they can be verified/updated by better information in new inventories.

GROWTH STUDIES

Commercial thinning was not scheduled in the Tongass Land Management Plan. Commercial thinning is an intermediate harvest which involves the removal of some trees from immature stands to accelerate the growth of the remaining trees, improve species composition and size class distribution, to capture volume that would be otherwise lost to mortality, and to improve other resource values. Very few 70 to 90 year age class areas had been harvested previously; these are the stands which would have been suitable for commercial thinning. Research indicates that there are very few hemlock-spruce stands which have been commercially thinned in North America. Because of lack of stands available and the limited experience with commercially thinning hemlock and spruce, this treatment method was not included in the yield calculations for Forest Plan timber program (Tongass Land Management Plan, 1979).

Second Growth Management Program

A Second Growth Management Program (SGMP) was initiated on the Tongass in 1982. The Program's goal was to "develop, implement, monitor, and demonstrate a program to manage second-growth stands of hemlock and spruce forest on the Tongass National Forest to increase timber production and improve wildlife habitat capability." (Second Growth Management Program, Alaska Region, 1984)

The program had a short-term and a long-term objective. The short-term objective was to establish demonstration areas to test and evaluate precommercial and commercial thinning treatments for wildlife habitat improvement. The long-term objective was to develop direction and guidelines for second growth management in Southeast Alaska.

January 1985 brought changes to the Second Growth Management Program. All references to administrative studies were eliminated and all present and future projects were to be classified as demonstrations. Studies of commercial thinnings were to be limited to those in progress and precommercial thinnings were to be established.

Recent activities in the SGMP have included monitoring of commercial thinning projects in 1987 and establishment of precommercial thinning demonstration areas between 1988 and 1990. Analysis of the 1987 commercial thinning data is not available at this time.

Other research in relation to second-growth includes a study of fish habitat relationships to second-growth forests by the Pacific Northwest Forest Experiment Station and Region 10 and a study of "Fish and Invertebrate response to solar input and riparian instream cover in Second and Fourth Order Steams in Southeast Alaska" conducted by the University of Idaho (Second Growth Management Program, 1988 Status Report).

SILVICULTURAL SYSTEMS

Recent improvement in timber markets has coincided with greatly increased public interest in recreation, esthetics, wildlife, and other values of forests. In many places these nontimber values strongly influence the choice of silvicultural systems and cultural treatments such as site preparation through prescribed burning.

Biological Factors

Biological factors frequently prevent the use of certain silvicultural systems. Some of the more common of these factors governing the choice of a silvicultural system recur in many of the timber types.

1. Reproductive habits and requirements of the desired and competitive tree species are among the most important factors influencing the choice of a silvicultural system. (See Appendix P for a detailed description of silvicultural systems.) If forests are regenerated in the shade, the shade-tolerant species will be favored and sooner or later will predominate. Fast-growing, shade-intolerant trees usually dominate stands regenerated in full light. The important forest trees of the United States are summarized in "Silvics of Forest Trees of the United States".
2. Wildlife requirements and problems are important in the choice of cultural treatments, and also in the choice of silvicultural systems. Browsing animals are favored by systems that provide clearings of appropriate size, shape, and dispersal for production and utilization of low browse. Squirrels are favored by systems or rotation lengths that result in abundant seed production and mature trees for nest sites. Consumption of seed by birds and rodents and damage to young trees by browsing and gnawing animals are serious enough in some timber types to influence the choice of silvicultural systems and cultural treatments.
3. Hazards created by insects and diseases are important in the choice of silvicultural systems. When stands are heavily attacked by serious disease or insect pests, it may be necessary to remove the affected trees or the entire stand. But protection against insects, such as shoot weevils of certain pines, is aided by maintaining a canopy over the reproduction, as in the shelterwood system.
4. Use of fire in forest management also limits the choice of silvicultural systems. In a few forest types, periodic use of prescribed fire reduces hazardous accumulations of flammable debris and undesirable undergrowth. Periodic prescribed burning is adapted chiefly to even-aged stands, because the young regeneration present in all-aged stands is easily killed by fire. All-aged stands systems, on the other hand, leave less concentration of debris resulting from any one harvest cut and tend to make disposal of debris less essential.
5. Climatic hazards are another important element in the choice of a silvicultural system. For example, on sites subject to heavy frost near ground level, a new seedling crop must be started under a partial canopy of trees to protect the seedlings. On the other hand, certain mountain and coastal sites, subject to high wind velocities, should not be partially cut. Clearcutting is usually required on windy sites and in shallow-rooted

forests on wet soils to avoid the risk of windthrow that occurs in partially cut stands.

6. Size, age and vigor of the trees in the existing stand are other serious constraints of biological factors. A production forest composed wholly of trees of advanced age and declining vigor ordinarily requires a heavy harvest cut such as a clearcut, seed-tree, or shelterwood. Attempts to use the selection system in overmature even-aged stands have consistently resulted in high mortality among remaining trees. The selection system is better suited to stands composed of trees which vary considerably in age, size and vigor.
7. Genetic improvement of trees is another factor influencing the choice of silviicultural systems. Improved strains of forest trees are coming out of the nurseries in increasing numbers, and superior trees of many important species will be produced in the future. For most species the growth potential of these improved varieties can be realized only if they are planted and grown in even-aged stands.

Of course, certain factors can lead to a decision that no harvest cutting should be done. They may include unstable soils unsuited for road construction, shallow soils or severe sites where a new crop cannot be started, or areas that have unique value in the untouched state.

Finally, the ultimate choice of the system for a particular tract involves analysis of various managerial constraints. These include availability of manpower, equipment and capital and also of markets for different classes of timber. These factors have an important bearing on the efficiency of operating under different silvicultural systems, but they vary so much with time and place that they are beyond the scope of this discussion.

Pacific Northwest Silvicultural Systems

Hemlock-spruce forests occupy a coastal strip 2,000 miles long, extending from northern California to Prince William Sound, Alaska. The portion within the United States (Alaska, Washington, Oregon, and California) totals about 10 million acres. Toward the south, other tree species within this type include redwood, Douglas-fir, red alder, western redcedar, Pacific silver fir, and lodgepole pine; toward the north and west, Alaska-cedar and mountain hemlock. Coastal forest stands are very dense, and timber volumes per acre in natural stands are among the highest in North America.

Climate within the coastal hemlock-spruce forest type is characterized by moderate temperatures, heavy precipitation, prolonged cloudiness, and frequent summer fog. Extended summer droughts are lacking. Average annual temperature and length of growing season decrease northward, as does fire hazard. Storm winds often sweep in from the Pacific Ocean causing repeated wind damage. Uprooting of trees is severe where a high water table, impervious soil layer, or thin soil over bedrock causes trees to be shallow rooted. Other high-hazard areas exist where topography constricts the wind and increases its velocity.

Western hemlock, the main component of the type, is a prolific seeder. In Oregon and Washington it produces some seed most years with heavier crops every 3 to 4 years. In Alaska a heavy crop occurs every 5 to 8 years. The seed is very small and is disseminated considerable distance by the wind. Germination under forest conditions is excellent on such diverse material as moss, humus, decaying litter, and mineral soil.

Sitka spruce is also a good seed producer. Some seed is produced nearly every year. Substantial crops develop every 3 to 4 years in Oregon and Washington, and 5 to 8 years in Alaska. Dissemination of the seed is wide. Sitka spruce will germinate on almost any kind of seedbed, including organic substance, if moisture is abundant; but germination is best on mineral soil. On young soils low in organic matter or clay content, survival and growth may be low.

Western hemlock is very shade tolerant. Sitka spruce is less shade tolerant and tolerance probably decreases northward. In general, hemlock responds well to release (thinning of a tree stand, or removal of the taller "overstory" trees) after long periods of suppression (suppression refers to the adverse influence on tree growth from thick stands of trees or dominant overstory trees). Sitka spruce responds well in diameter growth but may not respond as well in height growth. Hemlock-spruce is often considered to be a climax type, but western hemlock probably represents the true climax. (Climax refers to the last stage in the evolution of a tree stand.)

Clearcutting in units of 25 acres to several hundred acres is the most commonly used harvest-cutting system.. Prompt natural forest regeneration usually follows with full stocking or overstocking of tree seedlings on harvested areas. (Stocking is the number of trees per unit of area; a fully-stocked stand is one in which the number of trees are optimum for overall tree growth.) Most seedlings originate after cutting from seed disseminated by surrounding stands. However, some seedling, usually western hemlock, become established under the mature stand before cutting, survive the logging operation, and are released by it, thereby gaining a head start on the next rotation. Artificial regeneration by seeding or planting is used only in special situations, for example, to increase the proportion of spruce or to add a component of Douglass-fir. Control of competing vegetation plus planting may be necessary in some area.

Large clearcuts decrease the length of cutting boundary exposed to the wind relative to the area clearcut and facilitate selection of windfirm stand borders. Progressive strip cutting toward storm winds helps to reduce wind damage in high-hazard areas. The present trend is to carefully select the location, reduce the size, and vary the shape of clearcuts to improve the appearance of harvest-cutting areas. Smaller clearcuts may also provide better wildlife habitat.

In areas where dwarf mistletoe is prevalent, understory hemlock seedlings are infected by a shower of seed from mistletoe in the crowns of overstory trees. In these situations, complete removal of the overstory and destruction of infected seedlings are needed to control this parasite.

Even-aged coastal stands in Oregon and Washington can be regenerated by the shelterwood system. Of the main species, hemlock is the most shade tolerant; thus the leaving of an overstory, as in shelterwood cutting, is more favorable to hemlock than to spruce regeneration. Such cutting minimizes the reproduction of the moderately shade-tolerant Douglas-fir and the light-demanding red alder and lodgepole pine; it also provides some natural control of competing shrubs and herbaceous plants that spring up under full sunlight. In Alaska, experience with shelterwood cutting is lacking, but other partial cuttings have resulted in extremely dense regeneration, primarily western hemlock. Growth rate of western hemlock and Sitka spruce seedlings is far slower under partially cut stands than on clearcut areas; Sitka spruce, especially, is suppressed.

In areas of high public use where esthetics are important, the shelterwood system has an advantage over clearcutting. However, the application of shelterwood cutting to areas of steep topography should await availability of improved logging techniques and equipment that will permit repeated operations in the residual stand without causing excessive damage. Areas having high blowdown hazard should be avoided unless repeated thinnings have developed windfirmness in the stand. Use of the shelterwood system is limited in defective stands where cull logs become a physical obstacle to logging operations, and its use is not suited to areas infested with dwarf mistletoe. The shelterwood system is not yet feasible in Alaska because of the species composition, climate, terrain, and large proportion of overmature and defective trees.

The presence of seedlings in uneven-aged climax stands where individual trees or small groups have died is evidence that the selection system might be used in certain situations where timber production is not the major concern. Limited experience, however, has shown that old-growth hemlock-spruce stands have not responded well to selection cutting. Nonetheless, selection cutting may have application where it is necessary to maintain a continuous forest canopy. Examples are campgrounds and other areas of high recreation use, scenic areas, streamside stands, and stands along highways. In these situations, individual mature trees as well as defective and diseased trees should be cut. Periodic removal of selected trees in reserved strips along streams can minimize blowdown across the streams.

The seed tree system generally is impractical because exposed trees tend to uproot during late fall or winter storms.

TIMBER HARVEST AND WOOD PRODUCTS SUPPLY

The Tongass Timber program is part of a long-term cooperative effort with the State of Alaska and local government to provide greater economic diversity in Southeast Alaska and more year-long employment. The Forest Service established requirements to process National Forest timber in Alaska, including the construction and operation of pulpmills via long-term, 50-year timber sale contracts. Maintaining timber supply opportunities for the Southeast Alaska timber industry was a major objective of the Tongass Land Management Plan (TLMP) and the Alaska National Interest Lands Conservation Act (ANILCA).

The forest products industry in Southeast Alaska has four principal sources of timber (see also Table 3-135 and Figure 3-46):

1. Forested lands of the Tongass National Forest administered by the USDA Forest Service.
2. Timber inventory held by private Native corporations.
3. Timber sales of the State of Alaska; and,
4. Imported (from other states or Canada) logs and chips.

Primary manufacture is required for Federally administered timber. On the Tongass, timber is used to make dimension lumber, rough-sawn timbers called cants, and pulp. Export of timber from the National Forests in Alaska is restricted to products specified by the Federal Government under the Act of April 12, 1926 (44 Stat. 242, 16 USC 616). Under this Act and subsequent rulings, production of cants, planks, poles, piling, green veneer, pulp, and chips produced from mill waste constitutes primary manufacture of timber from National Forest lands. Cedar round logs and salvage sales that are considered surplus to the needs of domestic users may be exported. Some of the western red and Alaska-cedar harvested on Federally administered land is sold (under exemption from primary manufacture) as logs for export.

TABLE 3-135
TIMBER SUPPLY FROM SOUTHEAST ALASKA, FY 1980-1988 (Million Board Feet, Log Scale)

	1980	1981	1982	1983	1984	1985	1986	1987	1988	Annual Average
Tongass NF										
Sawtimber	428.3	339.5	326.6	220.0	226.7	162.5	251.4	282.0	331.5	285.4
Utility 1/	51.8	47.8	43.8	30.0	34.0	69.5	39.1	54.2	64.7	48.3
State of Alaska										
Sawtimber	32.5	38.1	26.2	20.9	14.3	3.3	10.4	16.1	13.5	19.5
Utility	0.5	0.7	0.0	0.1	0.5	0.5	0.2	0.3	0.1	0.3
Native Corporations										
Export Sawlog	83.0	31.6	137.0	249.3	202.3	225.3	295.9	286.1	286.4	199.6
Pulplogs 2/	61.8	35.4	22.3	42.6	56.0	46.6	-0.4	110.0	121.3	55.1
BIA	12.8	4.7	2.8	3.1	1.1	0.1	0.0	0.0	0.0	2.7
SE AK Sawlog	556.6	413.9	492.6	493.3	444.4	391.2	557.7	584.0	631.4	507.2
SE AK Total	670.7	497.8	558.7	565.9	534.8	507.8	596.6	748.5	817.5	610.9
Imports										
Sawlogs	33.0	27.1	3.1	21.1	5.7	7.8	24.4	5.7	0.1	14.2
Pulplogs	0.0	0.0	0.0	2.0	38.0	11.9	22.1	5.1	6.8	9.5
Wood Chips 3/	0.0	0.0	0.0	0.0	15.6	0.0	0.0	0.0	0.0	1.7
Total Supply	703.7	524.9	561.8	589.0	594.1	527.5	643.1	759.3	824.4	636.4

Source: USDA Forest Service, Alaska Region

1/ Utility volume includes logs with less than one-third net sawlog volume but contains at least one-half firm usable pulp chips. The Tongass Land Management Plan does not include utility logs or residual chips in the annual allowable sale quantity of 450 million board feet.

2/ Native Corporation harvests from Southeast Alaska are estimated.

3/ Wood chips are converted to log scale at a ratio of 2.7 short tons per million board feet. (See APPENDIX TM-E Metric and English Equivalents.)

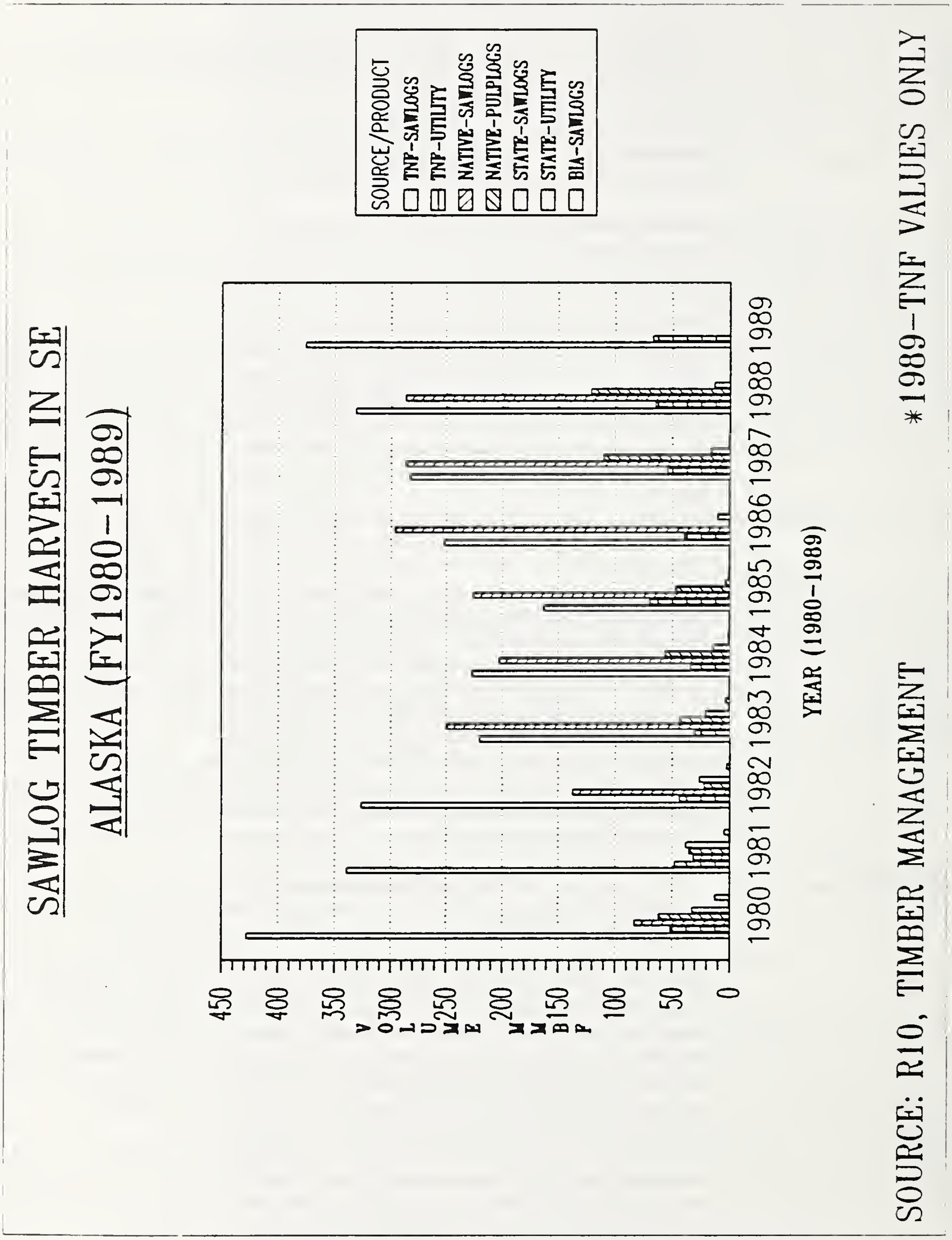
4/ FY1989 Tongass Harvest- Sawlog = 376.1 MMBF and Utility = 67.0 MMBF

UTILITY VOLUME

Utility logs are defined as a log grade with less than 33 1/3 percent net sawlog volume (i.e., the volume usable for making sawlogs) but containing at least 50 percent firm useable pulp chips. The Tongass Land Management Plan did not include utility logs or residual chips in the yield calculation of 450 million board feet annual available sawlog harvest (1920-2-4 (G-12), November, 1988). Since ANILCA adopted the annual sawlog harvest from TLMP for the 4.5 billion board feet per decade timber supply (Sec. 705 (a)), utility volume was not included in ANILCA. TLMP did address utility log volume by identifying an additional 96 million board feet annual utility volume in the total timber harvest, consumption and employment estimate (TLMP, 1979, page 173).

The average annual utility volume harvested from the Tongass National Forest for the period 1980-1988 was approximately 48.3 million board feet, representing approximately 14.5 percent of the total harvest from the Tongass during the same period (Timber Supply and Demand, Draft-1988 Report, 1989).

FIGURE 3-46


SAWLOG TIMBER HARVEST IN SE ALASKA (FY1980-1989)
SOURCE/PRODUCT
TNF-SAWLOGS
TNF-UTILITY
NATIVE-SAWLOGS
NATIVE-PULPLOGS
STATE-SAWLOGS
STATE-UTILITY
BIA-SAWLOGS
450
400
350
300
250
200
150
100
50
0
VOLUME MMBF
1980 1981 1982 1983 1984 1985 1986 1987 1988 1989
YEAR (1980-1989)
SOURCE: R10, TIMBER MANAGEMENT
*1989-TNF VALUES ONLY

The Tongass Land Management Plan Revision will follow the same guide as the 1979 Forest Plan. Utility volume will not be calculated into the Allowable Sale Quantity calculation. The Forest Inventory being used as the basis for determining the stand characteristics and yield tables for the Revision does not identify the utility volume component of the Forest. Utility volume is part of the gross volume and is lumped with all nonmerchantable (cull) volume when calculating net sawlog volume (1920-2-4 (G-12), November 7, 1988).

EXISTING TIMBER INDUSTRY

Before 1950, the timber industry was not an important sector of Southeast Alaska's economy. There were numerous sawmills including those at Juneau, Wrangell, Petersburg and Ketchikan; a plywood mill operated at Juneau and a pulp mill at Port Snettisham (south of Juneau) for approximately one year in the 1920's. The mills produced lumber for building, mine timbers, and salmon packing crates. During World War II, Sitka spruce was in high demand for use in the construction of aircraft. There was also a demand for logs for use in fish traps.

The current structure of Southeast Alaska's lumber and wood products industry is dominated by five sawmills and two pulp mills. A new sawmill began production in the spring of 1989 in Ketchikan. These five sawmills and a number of small portable mills produce cants, flitches, and dimension lumber for export. Cants and flitches are semi-processed, rough sawn logs meeting federal primary manufacturing requirements. The two pulp mills produce dissolving pulp for both the U.S. domestic and export markets. Alaska's dissolving pulp (special alpha grade) is produced from wood fibers, and is a basic ingredient for rayon, cellophane, and other specialized industrial and aerospace materials.

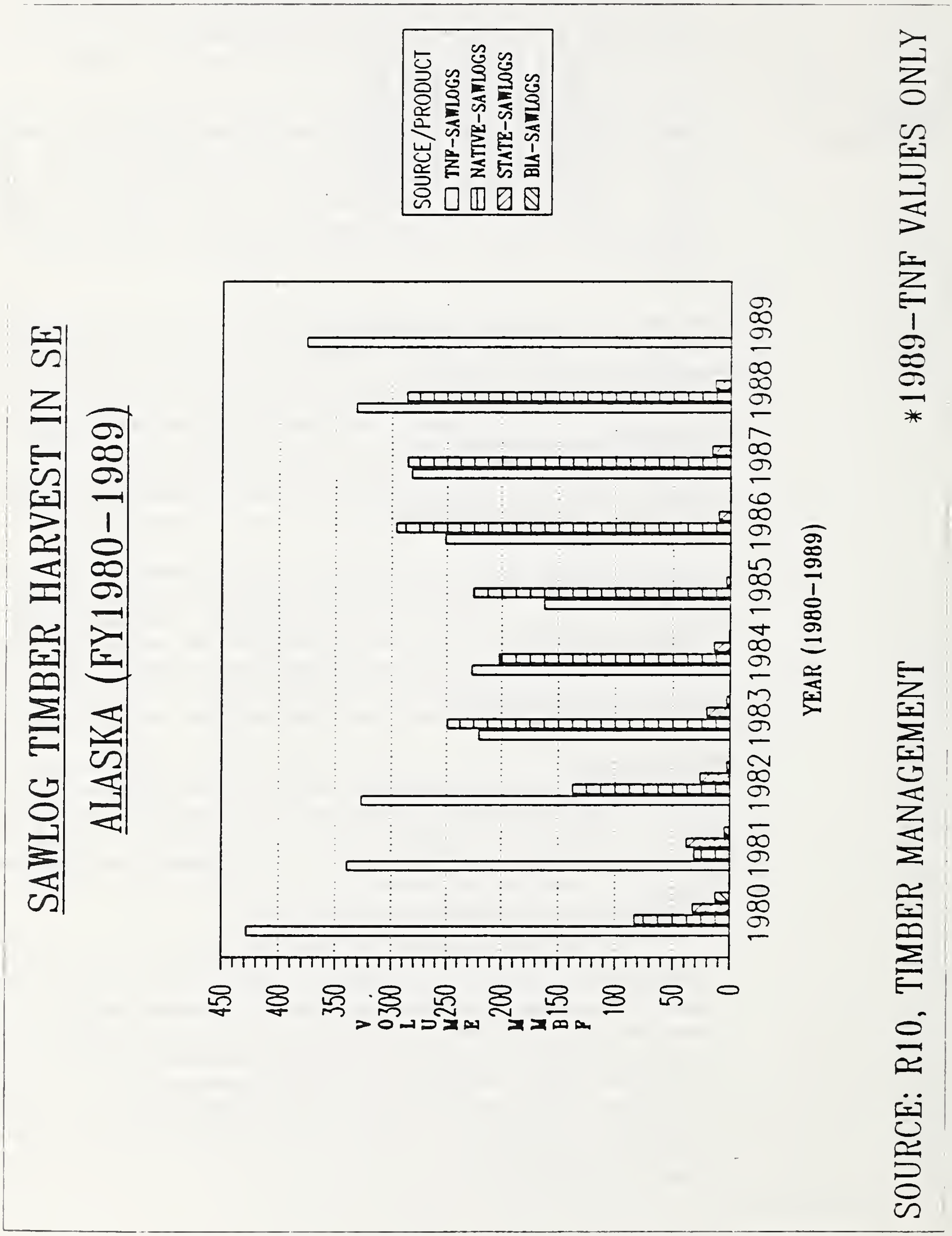
Since 1979, the 13 Native Corporations in Southeast Alaska have exported unprocessed logs. These log exports have affected the industry structure by displacing, to some extent, cants in export markets. Figure 3-47 shows the rise of export sawlog products from Native lands during the period 1980-1986. Sawlog products harvested from the Tongass National Forest dropped as Native export rose. The economic well-being of Southeast Alaska's timber industry is governed by export market conditions and competition from other Pacific Rim suppliers.

PULP

Historically, nearly half the timber harvested from the Tongass National Forest has been used for pulp. Between 1981 and 1987, Alaska's pulp mills did not operate at capacity because of a reduced worldwide dissolving pulp demand, greater competition by existing suppliers, and the entry of newer and lower cost pulp mills. This situation has improved with the recent closure of a dissolving pulp mill in Japan and with several Third World mills switching to other types of pulp, an option their technology permits.

Over the last decade, declining profits forced a number of less efficient producers of dissolving grades to close production facilities or convert them to paper-making grades. The profit decline was due to excess capacity which forced market prices for the dissolving grades below sulphite and sulphate paper grades of pulp which are much cheaper to manufacture (Canadian Pulp and Paper Association - 1987). World production of dissolving pulp fell from a high of 4.87 million metric tons in 1978 to a low of 4.06 million metric tons in 1982 (FAO, 1988). The reduction in producers in the dissolving pulp industry, and the recent global expansion in pulp demand, has bolstered the market position of Alaska's pulp manufacturers.

FIGURE 3-47


SAWLOG TIMBER HARVEST IN SE
ALASKA (FY1980-1989)
SOURCE/PRODUCT
TNF-SAWLOGS
NATIVE-SAWLOGS
STATE-SAWLOGS
BIA-SAWLOGS
VOLUME MMBF
450
400
350
300
250
200
150
100
50
0
1980 1981 1982 1983 1984 1985 1986 1987 1988 1989
YEAR (1980-1989)
SOURCE: R10, TIMBER MANAGEMENT
*1989-TNF VALUES ONLY

Two firms make up Southeast Alaska's pulp industry: the Alaska Pulp Corporation mill (APC) in Sitka, an American company wholly owned by Japanese interests, and the Ketchikan Pulp Company pulp mill, a subsidery of Louisiana Pacific, owned by American interests near Ketchikan. The Ketchikan Pulp Company mill has operated continuously. Poor markets and labor disputes closed APC between July and October 1985. The pulp capacity of the two firms is shown in Table 3-136.

TABLE 3-136

SE ALASKA WOOD PROCESSING CAPACITY (Sawlog and Utility Log MMBF Volume/Year)

Firm	Pulp Capacity Log MMBF/yr	Pulp Capacity Pulp M Tons/yr	Chip By-Products BDU/yr	Chip By-Products Log Eq. MMBF/yr	Sawlog Capacity MMBF/yr
Alaska Pulp Corporation	160	192			
Ketchikan Pulp Company	190	200			
Klawock Timber Ak.			75,000	30	60
Wrangell Forest Products			120,000	48	108
Ketchikan Pulp - Annette			67,000	27	100
Chilkoot Lumber Company			45,000	18	60
Other Small Mills					36
Totals	350	392	307,000	123	364

Source: USDA-Forest Service, Alaska Region and operator furnished data.

1/ Includes sawlog and utility grade logs, but does not include residual material from cant and waney mills.

2/ Log and chip material from all sources, National Forest timber, Native timber, and imports from British Columbia.

3/ Formerly Alaska Lumber and Pulp.

Through fiscal year 1988, Alaska's pulp manufacturers operated at full capacity. Rising product prices have them scrambling for new ways to boost production within the existing production lines and adding increments to capacity where it is feasible and financially prudent. While Alaskan pulp producers continue to boost output, competing capacity abroad continues to decline due to better business opportunities in paper pulp production. Most observers believe dissolving pulp producers will continue to increase product prices until they establish a differential with paper pulp that reflects the higher cost of manufacturing dissolving grades. Historically, this differential has been as much as $100 a ton (Pulp and Paper Week, 1988). The Alaskan dissolving pulp manufacturers should be successful in lifting prices as long as the demand for paper pulp outstrips capacity.

Pulp Log Imports

Over the last six years, Canada has become an alternate source of pulp logs for the Southeast Alaska industry (Table 3-137). Log imports increased dramatically between 1982 and 1984. Due to a shutdown of the Sitka pulp mill and reduced production in the Ketchikan mill, log imports were curtailed during 1985 (19.7 million board feet). A dramatic increase in log imports occurred during 1986 (78 million board feet), due to resumption of pulp production in Alaska and the availability of Canadian logs from a border area (Portland Canal). Log imports from Canada declined again in 1987/1988 because the world market for paper-grade pulp increased. This market condition has opened up a market in Canada for Alaska produced pulp-grade logs.

TABLE 3-137
ALASKA LOG IMPORTS FROM CANADA, 1980-86

Year	MMBF
1980	37.1
1981	21.5
1982	1.5
1983	62.0
1984	65.8
1985	19.7
1986	78.0

Source: U.S. Department of Commerce, Foreign Trade Division.

CANTS AND LUMBER

Sawmill capacity increased from 236 million board feet in fiscal year 1987 to about 364 million board feet in fiscal year 1988. The two sawmills producing lumber and cants for export in 1987 are operating at higher rates than they were a year ago, and, in 1988, were joined by two more mills. The lumber and cant producers are Wrangell Forest Products, the Annette Hemlock mill (a joint operation between the Annette Indian Reservation and KPC), the Chilkoot Lumber Company in Haines, and Klawock Timber Alaska, Inc. in Klawock. Nine smaller mills operate intermittently with a combined annual capacity of 36 million board feet. The average individual production level for the smaller processors is normally less than 1 million board feet of softwood logs. The sawmill capacities are found in Table 3-136.

Compared to their operating capital, several sawmills have invested heavily in additional machinery and staff to add value to the raw material passing through their mills. Wrangell Forest Products processes 60 percent dimensional lumber, less than 5 percent in cants, and the balance in graded flitches. Eighty percent of the hemlock logs passing through the Chilkoot Lumber Company mill in Haines are sawn as dimensional lumber with 40 percent of the spruce being both sawn to dimension and planed. From start-up in December 1987, the mill in Haines with an annual capacity of 32 million board feet per shift has added a second shift and employs 97. In February 1989, the Ketchikan Pulp Company began operating a new $12.5 million sawmill adjacent to its pulp facility in Ketchikan. The new sawmill with an annual capacity of 60 million board feet per shift will boost utilization of small logs. Employment at the mill requires 70 new employees when a second shift is operated. The mill is geared to cut metric or domestic sizes (Shaub 1988).

SUPPLY SOURCES

As previously mentioned, the forest products industry in Southeast Alaska has four principal sources of timber: forested lands of the Tongass National Forest administered by the USDA Forest Service; timber inventory held by private corporations (principally Alaska Native Corporations formed through ANCSA); timber sales of the State of Alaska; and imported logs and chips. Federal timber is used to make dimension lumber, rough-sawn timbers called cants and pulp. Some of the western redcedar and Alaska-cedar harvested on Federally-administered land is sold (under exemption) as logs for export. Timber from private and State land is exported as logs or sold to local pulp mills. In strong markets, such as those in 1979 to 1980 and 1987 to present, lower grade timber from all ownerships can be sold to local pulp mills or chipped and exported as woodchips. In poor markets, such as during the period 1981 to 1987, this lower grade timber is generally not marketable and becomes surplus.

EXPORT MARKETS

In addition to supplying domestic processors, Alaska's forest products industry exports high-quality pulp products which are competitive worldwide. In fiscal year 1988, Alaskan manufacturers exported $160 million in pulp products to 16 countries in Asia, Europe, and Latin America. The major markets for Alaska's output of softwood logs, cants and lumber in fiscal year 1988 were Japan, South Korea, Canada, Taiwan, and China. Log exports were valued at $261 million and lumber shipped abroad in fiscal year 1988 was valued at $52.1 million. Table 3-138 displays export information.

TABLE 3-138
FOREST PRODUCT EXPORTS FROM ALASKA TO ALL DESTINATIONS, 1980 to 1988

	1980	1981	1982	1983	1984	1985	1986	1987	1988
					Product/Unit				
				Softwood Logs					
Volume (MMBF) 1/	179.7	130.1	197.5	292.6	237.6	258.6	340.3	436.1	482.2
Value ($millions)	91.4	68.4	95.4	128.3	97.1	99.6	137.9	179.6	261.6
Unit Value $/MBF	509	526	483	439	408	385	405	412	543
				Lumber and Cants					
Volume (MMBF)	266.5	202.5	178.6	136.0	113.3	122.1	93.7	121.1	153.4
Value ($millions)	96.6	60.3	62.5	45.5	32.2	32.5	24.7	33.9	52.1
Unit Value $/MBF	362	298	350	334	284	266	263	280	340
				Woodchips					
Volume (MSTN)	159.0	66.7	93.5	21.0	11.6	4.9	0	0	11.5
Value ($millions)	10.6	5.5	6.4	1.3	.3	.4	0	0	.6
Unit Value $/STN	66	82	68	60	29	89	0	0	49
				Woodpulp					
Volume (MSTN)	325.0	278.8	232.6	207.8	274.7	183.5	224.6	255.7	287.1
Value ($millions)	158.6	135.7	113.3	94.8	127.3	72.0	85.4	113.9	160.4
Unit Value $/STN	488	487	487	456	463	393	380	446	559
TOTAL VALUE ($millions)	357.2	269.9	277.6	269.9	256.9	204.5	248.0	327.4	474.7

Source: Timber Supply and Demand 1988 Report, 8/89
1/ Volumes exported are in millions of board feet (MMBF) or thousands of short tons (MSTN). Values are free along ship (FAS) in millions of nominal dollars. Unit values are dollars per unit.

In each product and foreign market, Alaskan manufacturers must compete with softwood producers from the Pacific Northwest, British Columbia, the Soviet Union, New Zealand, and Chile. In a variety of structural and decorative end-uses, Alaskan lumber manufacturers must also compete with hardwood suppliers from Southeast Asia.

Japan remains the largest importer of softwood products outside North America. In fiscal year 1988, Japan imported 48 percent of Alaskan pulp exports, 81 percent of log exports, and 93 percent of lumber exports. The good export market for forest products has tightened supplies sufficiently that Alaskan producers are finding markets for pulp-grade logs in British Columbia.

Since 1986, markets in the Pacific Northwest have been established for Alaskan timber products. In addition, producers of semi-finished products (such as cants) have shifted some production to surfaced lumber cut to metric dimensions for the Japanese construction markets. Penetration into these markets characterizes the industry's thrust to diversify and produce higher value-added products.

The volume and value of Alaska's log exports increased for the fourth straight year in fiscal year 1988. See table 3-139 for a display of log export values.) Compared to fiscal year 1987, log export volume in fiscal year 1988 is up 10.5 percent, value soared 45.6 percent, and the average value per thousand board feet (MBF) climbed to a new record for Alaskan exports of $543 per thousand board feet. Similarly, lumber exports grew for the third straight year. In comparison to the previous year, fiscal year 1988 lumber export volume from Alaska expanded 26.6 percent, total value jumped 53.6 percent with the value per thousand board feet averaging $340.

TABLE 3-139
ALASKAN LOG EXPORTS VALUE BY FISCAL YEAR (Thousands of Dollars)

Exported to	1985	1986	1987	1988
Canada	1,707	1,564	9,840	9,313
China	745	0	3,775	3,229
Germany, West	0	0	0	17
Israel	0	0	37	0
Japan	91,415	126,466	148,874	211,393
Korea, South	5,778	9,613	16,595	33,668
Taiwan	0	293	524	3,778
Turkey	0	0	0	246
	-------	-------	-------	-------
World	99,646	137,935	179,645	261,643

Source: Timber Supply and Demand 1988 Report, 8/89
Note: Compiled from official statistics of the U.S. Department of Commerce.

This rapid growth in exports stems from the increased competitiveness of the dollar, the continued expansion of the U.S. and other Pacific Rim economies and constraints elsewhere on softwood supplies of Sitka spruce, tight-grained hemlock, and western red cedar. Clearly, the Pacific Rim converters continue to prefer logs; and softwoods from North America remain popular. Increased demand for transoceanic containers continues to plague Alaskan producers in their attempt to penetrate Asian lumber markets. Rising freight rates on containers to Asia reflect the success in selling more U.S. products abroad, but, these rates constrain lumber exporters wishing to sell directly to wholesalers and end-users abroad. Southeast Alaska does not have facilities to fill and load trans-Pacific containers. Asia-bound processed lumber from Southeast Alaska must be barged to Seattle or Anchorage to be containered. Containers or other forms of protected, below deck storage are necessary in the shipping of planed and dried lumber to avoid damage to it. This additional handling reduces the competitiveness of Southeast Alaska's lumber manufacturers to coastal producers in British Columbia, Washington, and Oregon.

Over the next few years, log exports from Southeast Alaska may decline as a number of private landowners complete harvest of their mature stands. In contrast, private landowners in Southcentral Alaska are projected to more than double their 1988 production of export logs (69 million board feet) to

approximately 170 million board feet in 1990. Lumber production in both Southeast and Southcentral Alaska is expected to grow substantially over the next two years, market permitting (Seymour 1988).

Increased penetration of North American softwood lumber into the Japanese, Taiwanese, and Korean markets is expected over the next few years. Shifts in the value of the dollar, successes by North American trade negotiators in reducing tariff and non-tariff barriers, and improved marketing by domestic manufacturers almost doubled the value and volume of lumber exports from the United States to Japan between 1983 and 1987 (NFPA 1988). More gains are likely as North American producers' associations have succeeded in presenting evidence to a number of Japanese jurisdictions that three-story wood-frame housing can be built which minimizes fire hazards when building components are correctly installed and maintained.

DISSOLVING PULP

Between fiscal years 1985 and 1987, the value of pulp exported from Alaska to foreign countries more than doubled, jumping from $72 million to $160.4 million. (Alaska pulp exports are shown in table 3-140). This increase was much greater than the growth in world demand for pulp which grew only 11 percent over the same period (Pulp and Paper, August 1987 and August 1988). World production of wood pulp by the sulphate and thermo-mechanical processes expanded dramatically to meet world-wide demand for printing and writing papers. While Alaskan pulp producers manufacture special alpha and dissolving grades which serve fabric and film manufacturers and not paper producers, they benefit or suffer from any world-wide trend in the pulp market.

TABLE 3-140
ALASKA PULP EXPORTS (Thousands of Dollars)

Exported to:	Fiscal Year 1985	Fiscal Year 1986	Fiscal Year 1987	Fiscal Year 1988
Argentina	0	1,326	1,239	1,341
Austria	0	0	103	0
Bangladesh	0	0	795	0
Belgium and Luxembourg	1,004	1,725	2,032	1,198
Bulgaria	0	531	246	0
Canada	958	0	0	354
China	5,099	7,572	14,436	16,842
Czechoslovakia	0	0	0	47
Egypt	4,850	5,343	3,122	5,621
Germany, West	456	1,610	931	2,171
Hong Kong	0	0	372	0
India	13,368	6,837	18,401	9,043
Indonesia	512	1,290	1,210	1,199
Japan	38,010	42,677	45,340	77,010
Korea, South	180	1,103	1,418	3,282
Netherlands	0	117	112	0
Poland	0	0	1,394	4,294
Soviet Union	0	3,271	4,015	5,247
Spain	920	1,571	0	1,271
Taiwan	5,311	8,180	16,846	28,880
Thailand	513	2,210	1,912	2,597
Venezuela	860	0	0	0
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World	72,042	85,366	113,924	160,398

Source: Timber Supply and Demand 1988 Report, 8/89

In the production of dissolving (special alpha) grade pulp, the U.S. maintains a clear positive balance of trade. Over the first 10 months of fiscal year 1988 (October 1987 - July 1988), U.S. production was 1.095 million short tons. Exports were 672,000 short tons, and imports stood at 88 thousand tons, for a net export balance of 584 thousand short tons (Survey of Current Business 1988). Worthy of note, total exports from the United States of the special alpha dissolving grades for fiscal year 1988 were 815 thousand short tons. Alaska exported 287.1 thousand short tons or 35 percent of the gross exports from the United States of dissolving pulp (Schedule B commodity 2500284).

THE JONES ACT

Movements of Alaska forest products are dependent on waterborne transportation systems because of the Alaska's location and geography. The Merchant Marine Act of 1920 (the Jones Act) restricts waterborne shipments between U.S. ports to vessels built and registered in the United States. There is a possibility that Congress may relax some requirements of the Jones Act; a decision that would affect the Alaska timber industry.

The majority of forest product shipments from Alaska are to foreign destinations and are, therefore, not regulated by the Jones Act. Few shipments of Alaska forest products are to markets within the United States, although most of the forest products consumed within the State of Alaska are shipped from the Pacific Northwest.

The major conclusion of impacts generated from the Jones Act on Alaska Forest Products Trade (PNW-196, 1986) was that the Jones Act affects Alaska forest products trade. The total 1982 reduction in producer and consumer wealth in Alaska was approximately $4.77 million with little change in the level of trade of individual products or in final market destinations occurring after relaxing the Jones Act. The effects of the Jones Act were small and transportation rate changes did not appear to be a major factor in determining markets.

As a greater volume of Native timber is harvested and available for export, more pulpwood will be jointly produced. Reducing the freight rate appeared to increase volumes moving to the continental United States. In response to higher hemlock log prices and shrinking supplies, recent market activity has included shipments of better grades of Alaska "pulpwood" to the Pacific Northwest. For the same reasons, chips, spruce cants, and hemlock cants may also find market possibilities there. Relaxing the Jones Act improved Alaska competitiveness only slightly in the Pacific Northwest, but generally not enough to open new markets and shift trade flows.

The long-run implications of relaxing the Jones Act to the Alaska forest products trade, although small, are several. Over time, the resource rents returning to timber producers could increase, while those of shippers with existing US-built vessels in their fleets may fall. As these vessels are retired, the operators will again receive returns comparable to those received by their competitors using foreign-built vessels. Thus, altering the Jones Act will favor operators with fleets near retirement age and new entrants in the shipping business.

Alaska consumers will benefit as the prices of construction materials fall with changing freight rates. The short-run effect will increase consumer savings, while in the long run, housing costs could drop slightly.

Relaxing the Jones Act would help the Alaska forest products industry become more competitive with adjacent timber supply regions (British Columbia and the Pacific Northwest), and new trade patterns could eventually develop.

CURRENT DEMAND FOR TIMBER FROM THE TONGASS NATIONAL FOREST

Over 90 percent of the wood fiber harvested in Alaska is exported. The solid wood products--logs, cants, and lumber, are shipped to Japan, Korea, the Peoples' Republic of China, Taiwan, and Canada. The dissolving pulp produced from the hemlock and lower grade spruce logs is shipped to a wider array of markets. For example, in 1988, pulp products were shipped from Alaska to Argentina, Austria, Bangladesh, Belguim, Bulgaria, China, Egypt, France, West Germany, India, Indonesia, Iraq, Japan, and six other foreign markéts. Approximately 15 percent of the dissolving pulp produced in Alaska is shipped to destinations in the continental U.S. For a host of reasons, this dependence on exports is expected to continue over the planning horizon (Martin, 1989)

Because forest products producers in Alaska depend on foreign exports, the level of harvest and manufacture in Alaska is dominated by world macroeconomic conditions and the competitiveness of alternative suppliers both foreign and domestic. For any given level of demand, the product mix exported from Alaska is a function of the pattern of timber ownership and the objectives of its owners. Over the last decade, the product mix, source of supply and level of output from Alaska forests changed dramatically.

Until 1980, the forest products industry in Alaska exported mainly cants and pulp harvested under long-term sale agreements from the Tongass. Little merchantable timber was in private ownership. As a result of the Alaska Native Claims Settlement Act and the Alaska Statehood Act, local and regional native corporations, and the State of Alaska, gained a significant volume of merchantable stumpage. The Alaska native corporations began an extensive harvest program. The timber was offered to both local operators and export brokers. Generally, the best market return was exported logs. Therefore, the product mix shifted dramatically during the 1980's as logs increased as a share of output. As the rising dollar made American products increasingly more costly to foreign buyers, most cant producing facilities in Alaska closed. Timber harvest on the Tongass declined dramatically, falling from 428 million board feet in 1980 to 163 million board feet in 1985.

From 1981-1985, comparatively low inflation, strong economic growth, political stability, and a surging stock market kept the dollar in high demand making the cost of U.S. exports prohibitive to foreign buyers. The more value added in the U.S., the more prohibitive the cost. As a result, Pacific Rim countries bought logs from Alaska and made their own lumber and pulp at home. Beginning in 1985, the seven largest market economies agreed that their currencies were out of line and began a program of adjustment. The Federal Reserve began to lower its discount fees aggressively, but the stock market only surged in reaction. The value of the dollar in foreign exchange began to ebb only as the external trade deficit of the U.S. began to loom.

The fall in the dollar effectively doubled Japanese per capita income. Since 1985, the average Japanese consumer's purchasing power has expanded enormously and goods produced in Japan are now much more expensive than goods produced elsewhere. Just as the Japanese wanted to import and process logs in the mid-1980's, now they are eager to have logs processed outside Japan. As a result, Alaskan wood products manufacturers are scrambling. The Japanese can use all the fiber Alaskan firms can process and ship. For example, in fiscal year

1988 pulp exports from Alaska were 287 thousand short tons just below their peak in fiscal year 1980 of 325 thousand short tons. The preliminary figures for fiscal year 1989 indicate that Alaskan pulp producers may exceed even their 1980 output level as pulp prices soar.

The outlook for Pacific Rim production and trade suggests that the harvests in Alaska will average between 500-700 million board feet per year over the next decade. The proportion of Alaskan timber harvested annually on the National Forests will continue to depend on the liquidation rate of the private inventories. Under any rate of liquidation for private harvest, the share by ownership in the 1990's is expected to look more like the pattern experienced between 1960 and 1980 when Forest Service harvest provided more than two-thirds of the total Alaskan harvest (Martin, 1989).

DEMAND FOR PULPWOOD

Demand for pulpwood in the Pacific Rim is projected to increase. changes in the world pulp market are crucial because they dominate the direction and strength of the pulpwood demand in Alaska and the Tongass National Forest, in particular. At the moment, the Pacific Rim fiber market is extremely tight. The appreciation of the yen against most other currencies makes it cheaper for Japanese builders to buy imported lumber if the product meets their domestic specifications. At the same time, sources of South Sea logs are narrowing as Indonesia and Peninsular Malaysia tighten their bans on log exports and Phillipine supplies continue to decline, although, the Indonesians have been very successful in exporting hardwood plywood to Japanese markets. In combination, these events have lowered Japanese domestic production of sawnwood and plywood. Their smaller sawmill and plywood mill output yields less waste meaning fewer chips are available for pulp production. The rapid expansion in North American and Japanese consumption of printing and writing paper has driven up the Japan's demand for imported pulpwood, pulp, and waste paper (Japan Pulp and Paper June 1988a). The United States and Australia have supplied the largest share of log and chip exports to meet Japan's growing pulpwood demand with additional supply from Canada, New Zealand, South Africa, and the USSR.

Just as growth in the Japanese market is pressuring pulpwood supply around the Pacific Rim, their imports of market pulp is having an equal effect on pulp prices throughout the region. Japanese imports of pulp have risen from 10.9 percent of total consumption in 1976 to 21.9 percent of consumption in 1987 (Japan Pulp and Paper June 1988b). Since 1986, rapid increases in the world price of selected softwood pulps have made imported softwood pulp more expensive than domestically produced Japanese softwood grades. Still, the domestic Japanese demand for paper has been so strong that domestic capacity is fully committed. Seventy-five percent of the Japanese pulp imports are from North America. Since the balance of Japanese pulp imports are also from Pacific Rim partners, the pressure on wood fiber remains intense.

The Japanese Paper Association predicted a 5.3 percent increase in paper pulp consumption for their fiscal year 1988 (April 1988-March 1989 - See table 3-141). This 5.3 percent increase in consumption will be only partially satisfied by the expected 4.8 percent growth in domestic pulp production. The gap will be filled by imports which are expected to reach 2.7 million metric tons, up 5.4 percent. The 4.8 percent increase in output of Japanese pulp will come wholly from increased imports of pulpwood. In an effort to satisfy this demand, the Japanese industry anticipates purchasing fiber supplies from sources as distant as oak chips from the southern part of the U.S. (Japan Pulp and Paper September 1988). In summary, continued strong demand for pulpwood from the

Tongass is expected through fiscal year 1989. Opportunities exist to develop hardwood chip exports from Southcentral Alaska

TABLE 3-141
JAPANESE PULPWOOD CONSUMPTION (1987) AND PROJECTIONS (1988) (1000 Cubic Meters)

	1987	1988	% Change
Domestic Pulpwood			
Softwood Logs	1,486	1,530	3.0
Hardwood Logs	236	210	-11.1
Softwood Chips	7,229	7,270	0.1
Hardwood Chips	9,521	9,360	-1.7
Total Domestic	18,472	18,370	-0.6
Imported Pulpwood			
Softwood Logs	13	160	1103.8
Hardwood Logs	60	80	33.3
Softwood Chips	6,398	7,850	22.7
Hardwood Chips	6,968	8,010	15.0
Total Imports	13,939	16,100	15.5
Total Species			
Softwoods	16,785	16,810	0.1
Hardwoods	16,785	17,760	5.8
Total Pulpwood Consumption	33,570	34,470	2.7

Sources: 1987 data are from Japan Pulp and Paper vol 26:1 p26 and 1988 data are from Japan Pulp and Paper vol 26:2 p19

ALASKA'S FUTURE FOREST PRODUCTS TRADE

Alaska's trade opportunities are dominated by global macroeconomic conditions. Alaskan forest products output is more dependent on international trade than any other softwood-producing region in the United States. Currency shifts and macroeconomic growth policies of the major consuming markets simply overwhelm independent actions by processors in the local marketplace.

Southeast Alaska's comparative advantage in forest products will remain because of its stocks of mature tight-grained Sitka spruce, hemlock and cedar. Alaska is the principal supplier of Sitka spruce to the Pacific Rim marketplace, accounting for up to 68 percent of the total spruce exports from North America. Alaska's Sitka spruce is generally the highest quality available in the world and the select cuts command premium prices (Wissman et al. 1983). Similarly, in good markets, cedar logs and the clear hemlock lumber yield excellent returns in the Japanese market.

In contrast, Alaska's more abundant supplies of lower quality spruce and hemlock must compete with utility volumes of Douglas Fir, cascade hemlock, radiata pine, and Southeast Asian hardwoods in packaging and construction end-uses in the Korean, Chinese, and Taiwanese markets. For these price-sensitive traders, several species meet end-use specifications; therefore, delivered cost is paramount. As a result, market prices for lower grade logs, cants, and lumber fluctuate widely. This price uncertainty affects landowners and managers marketing timber stands which have a high component of low-grade fiber. Potential timber sale purchasers have an incentive to lower their bid to cover

risk when they are confronted with the prospect that prices may decline significantly before the first log is taken from the woods.

The Pacific Northwest (and especially the Douglas-fir region) is one of Alaska's main competitors in Pacific Rim markets. For the past several decades, softwood timber inventories (available for harvest) in this region have been falling while harvest levels (ignoring business cycles) have been roughly constant. Inventories declined nearly 15 percent between 1970 and 1986, while harvest in 1986 was slightly higher than that in 1970 (Haynes, Brooks - Draft, 1989). These trends are expected to continue through 2000 but should change afterwards.

In recent projections (USDA Forest Service, 1988) harvest levels in the Pacific Northwest (primarily of second growth) start to rise after 2000, making the region more competitive in both domestic and international markets for commodity grade solid wood products. These projections also suggest that little of the traditional, high-valued export timber (destined primarily for the Japanese market) will be available from private timberlands after 1995. In fact, second-growth logs already comprise a significant proportion of Pacific Northwest log exports. These declines in timber size and quality increase market opportunities for Alaskan log exporters, who will still have access to large, old-growth timber.

EXCHANGE RATES

The attractiveness of Alaskan forest products in foreign markets is heavily influenced by the cost of the Alaskan product in local currency in the face of domestically produced output and competitive foreign supplies. Currency shifts have both a price and an income effect. The purchasing power of Japanese consumers has doubled in the last two years. The opposite is true for the Chinese and Koreans as their currencies have weakened against the dollar.

A comparison of the buying power of the yen against both the North American dollars helps Japanese importers choose between products from the United States or Canada. Similarly, a comparison between the two North American dollars influences the profitability of Canadian trade with the United States vs. trade with Japan or Europe. While fluctuating within a trading range in fiscal year 1988, the United States dollar remained stable compared to the yen while the Canadian dollar has strengthened noticeably against the United States currency and has increased in value relative to the yen (Gruenfeld 1988). This has boosted Alaskan forest products exports to British Columbia. Identically, these currency adjustments have lowered the delivered price of Alaskan lumber and pulp in the Japanese market when compared to a similar product from Canada.

COMPETITORS

Canada

Market forces and trade negotiations between Canada and the United States directly affect the flow of British Columbia's log and lumber exports to the Pacific Rim. When access to the U.S. market shrinks due to economic downturn or trade impediments, the flow of British Columbia's logs to the balance of the Pacific Rim increases. The increased supply of British Columbia forest products competes directly with Alaskan exports.

Between 1981 and 1987, log exports from British Columbia grew 306 percent from 837 thousand cubic meters to 3.4 million cubic meters (Council of Forest Industries of British Columbia 1988). Log exports to Japan grew from 595 thousand cubic meters in 1981 to 2.5 million cubic meters in 1987, up 320 percent.

British Columbia has restrictions on log exports which relate to domestic needs, utilization, waste, and economic manufacture. In part, the increased log exports reflected the weak markets from 1981-85 which rendered a good deal of timber uneconomic for manufacturing and surplus to domestic needs. Beginning in 1986, the supply of timber qualifying for log export grew with a series of trade actions which imposed an import tariff (later replaced by an export tax) on Canadian lumber exported to the United States. The basis for the actions were charges by producers in the United States that Canada's industry was subsidized by low government fees for stumpage. Subsequent negotiations substituted increased stumpage charges by British Columbia for the tariff/export tax.

Much of the timber designated for export from British Columbia is the smaller, lower quality logs which compete with Alaska's hemlock log and sawn products. This export timber complements British Columbia's well- established export market for dimension lumber. The tariff/export tax on Canadian timber going to the United States diverted logs and lumber to the Pacific Rim markets. The higher stumpage fees are coupled with a requirement for Canadian producers who harvest crown lands to pay for reforestation. Since the new stumpage fees and reforestation costs replace the export tax on lumber, all products are affected, including exports and non-lumber wood products such as pulp. Progress in the political ratification of the Canada-U.S. Free Trade Agreement suggests the elimination of all tariff barriers affecting forest products exchanged between the two countries. Since the dispute began over the issue of stumpage charges and not trade barriers, ratification of the Free Trade Agreement will not return British Columbia's producers to their traditional cost position. The direction and speed of any new negotiations will affect Alaska's future.

In addition, British Columbia's provincial government imposed a tax on log exports based on the difference between the final export price and the lower domestic price (O'Brien 1988). Collectively, these changes lower the cost advantage enjoyed by producers in British Columbia and may affect their share of the market in the Pacific Rim and the United States.

It is important to note that log exports are largely incidental to total forest output in British Columbia. In 1987, log exports constituted only 3.7 percent of British Columbia's harvest of 90.6 million cubic meters.

Chile

Chile's radiata pine logs and chips compete with Alaska's construction-grade timber in China, Taiwan, and South Korea. Chile plans to develop more domestic processing capacity to complement a well-established marketing program aimed at Pacific and Atlantic markets. Between 1977 and 1987, Chile boosted output of sawnwood by 49 percent, woodpulp by 55 percent, and newsprint by 45 percent.

New Zealand

Like Chile, New Zealand's solid wood exports compete with Alaskan forest products in the packaging, dunnage, and construction end-uses in Japan, Taiwan, China, and South Korea. New Zealand's forest products exports have remained level or declined since 1983. The government of New Zealand has announced that the nation's public sector plantations will be auctioned to the private sector in the coming year. It is unclear how this privatization will affect future exports and the level of processing which will be undertaken.

If Australia, Chile, and New Zealand respond only with increased chip flows then Japan's domestic pulp industry will remain robust and continue to contribute to the by-product demand for logs and cants from Alaska. If Australia, Chile, and New Zealand pulp production and chip flows to Japan decline with the availability

of South Sea logs, then Japan's domestic pulp industry will weaken. Declines in Japan's domestic production of pulp lead to an increase in demand for dissolving pulp and dimension lumber from Alaska and a decline in the demand for Alaskan logs and cants.

Soviet Union

The Soviet Union remains the world's second largest producer of industrial roundwood and third largest exporter (FAO 1988). Despite its enormous production capacity, domestic consumption, and trade with the Eastern bloc absorbs most of the Soviet output. News of a large volume of Soviet barter trade with the Chinese has been discussed but not documented.

Japanese consumption of Soviet logs has remained steady or declined somewhat. Soviet log exports to Japan in 1987 were 6.125 million cubic meters, whereas, the U.S. provided 9.702 cubic meters (Japan Lumber Journal, 1988). Soviet lumber exports to Japan have climbed over the last 5 years, but remain below 200,000 cubic meters (Nippon Mokuzai Bichiku Kiko 1988). U.S. exports were 10 times larger at 2.4 million cubic meters (Japan Lumber Journal, 1988)

Exports of Alaskan forest products to Japan have expanded from $161.2 million in fiscal year 1985 to $336.8 million in fiscal year 1988. This is a total increase of 109 percent or an annual average growth of 36 percent. The value of log, lumber, and pulp exports to Japan have more than doubled.

OTHER FACTORS WHICH AFFECT DEMAND FOR ALASKA WOOD PRODUCTS

Japan, the major consumer of pulp and solid wood exports from Alaska, is projected to continue economic expansion after a pause in 1989 with a 3.0 percent increase in inflation-adjusted GNP in 1990, 3.5 percent in 1991, and a 3.5 percent increase in 1992 (Widman Management, Ltd. 1988). Rapidly rising real income in the country is having both a demand and supply effect.

Obviously, on the demand side, increased disposable and discretionary income have ballooned the consumption of all forms of non-durable paper and packaging, furniture and decorative end-uses of wood as well as expansion in housing services. Less transparent, is the supply-side effect. Rising incomes are also expected to expand the demand for amenity services of the country's national forests. In addition, a critical need to maintain erosive soils and protect watersheds is expected to constrain Japan's ability to expand its domestic wood supply.

Rayon, a significant end-use of Alaska's dissolving pulp, has experienced a major resurgence in the world's fashion industry. Much of the expansion in demand has been powered by a rayon cloth called challis. Most challis is made from high-wet-modulus rayon. Analysts estimate that between 130 and 150 million square yards of challis fabric were used in the U.S. in 1986. Japan supplied approximately 50 million square yards or about one-third of the total consumed. Roughly 95 percent of the rayon exported from Japan to the U.S. is made by the high-wet-modulus method. This production technique significantly lengthens the molecular chain length yielding a fabric which does not elongate much when wet thus overcoming a traditional fault of conventionally-produced rayon cloth (Chemical Business 1987).

Residential construction in Japan, especially wood-based housing starts, has a strong influence on the demand for solid wood exports from Alaska. Japanese housing starts increased in both 1986 and 1987. Total starts in 1987 were at the highest level since 1973, and were up 22 percent over 1986 levels. Wood and

nonwood based housing starts in 1987 were up 17 and 28 percent, respectively, over 1986 levels.

Continued economic growth throughout the Pacific Rim and a rise in the value of yen against the U.S. dollar have stimulated purchases from U.S. suppliers by Japanese builders. Since 1985, exports of logs, lumber, and pulp to Japan from Southeast Alaska have all increased. For 1986, the value of Alaska's forest products exports to Japan were up 20 percent from 1985. In 1987, they were up an additional 5 percent over the 1986 level. Forest products exports in 1986 represented about 20 percent of all Alaskan exports in terms of dollar value.

Over the last few years, the government of Japan has initiated policies to stimulate domestic consumption. These policies are designed to increase investment spending through tax incentives and labor reforms, which, in turn, will foster more consumer spending and create more leisure time. The tax incentives are specifically aimed at the housing sector. These policies are not expected to be implemented soon (Cargill and Moreno 1986). In any case, Japan will remain the principal market for North American timber exports, especially for high-grade, old-growth timber products.

China's Demand

The Chinese trade is a variable component of the North American-Pacific Rim timber exchange. In 1987, the People's Republic of China (PRC) log purchases from the Pacific Northwest and Canada declined by eight percent from 1986. In contrast, U.S. exports of softwood logs to China over the first nine months of 1988 increased 113 percent, to just under a billion board feet (USDA FAS 1988). Alaska's log exports to the PRC in fiscal year 1988 (11.6 million board feet) paralleled its trade in fiscal year 1987 (11.9 million board feet).

South Korea Timber Demand

South Korea represents expanded trade opportunities for Southeast Alaska and remains an important outlet for construction grade timber. In fiscal year 1988, South Korea imported 86.6 million board feet of Alaskan softwood logs and 370 thousand board feet of hardwood logs. South Korea's acceptances represented 18 percent of Alaska's softwood log exports and 82 percent of its hardwood log exports. The value and species composition of the Korean-bound log exports are shown in Table 5. Most impressive is the growth in the value of log exports to Korea over the last three years with a jump from $5.8 million in fiscal year 1985 to $33.7 million in fiscal year 1988.

Alaskan lumber shipments to Korea have fluctuated dramatically over the last decade. After exports at the 4 million board feet level in fiscal years 1980, 1982, and 1983, shipments dropped to zero in fiscal years 1984-85. After only slight penetration of the Korean market in fiscal years 1986 and 1987, Alaskan lumber producers resumed shipments at their historic level of 4.5 million board feet in fiscal year 1988.

Almost as spectacular as the boost in log exports to Korea has been the resurgence of Korean demand for Alaskan pulp. The value of pulp shipments to Korea from Alaska in fiscal year 1985 was a mere $180,000. In this last fiscal year, Alaska exported pulp valued at $3.8 million to Korean ports.

Taiwanese Demand

Forest products were the seventh largest commodity group exported by Taiwan in 1987. Forest products exports were valued at $2.2 billion or 4.2 percent of the country's exports (Jen 1988). With very little natural forest and government prohibition of logging in the nation's forest, Taiwan's extensive forest products industry relies completely on imported raw materials. Taiwan's solid wood

converters mostly process hardwood logs and cants into lumber, plywood and furniture for export to the U.S. and Japan. The nation's pulp and paper manufacturers produce mainly cultural papers for domestic consumption and packaging materials to support exports.

Alaskan forest products exports to Taiwan have grown from $5 million in fiscal year 1985 to $32.7 million in fiscal year 1988 with the greatest expansion in the value of pulp exports.

There are clear opportunities for hardwood producers of southcentral Alaska to market hardwood logs and chips to Taiwan. Less certain are the chances for increased exports of softwood logs or lumber from southeast Alaska into Taiwan. Most of the softwood processed in Taiwan is used in construction and packaging. Until 1988, the Taiwanese have met their needs for softwoods from the indigenous forest. The highest quality logs and lumber were exported to Japan with the falldown used to meet domestic needs. Since the Taiwan government has banned logging in mid-1988, all future softwood requirements must be met through imports. Alternative supplies of radiata, hemlock, and larch are likely to beat Alaskan suppliers in the very price-sensitive Taiwan market for construction and packaging uses. Alaska's comparative advantage in trade with Taiwan will be in small shipments of red and yellow-cedar. Since the Taiwanese solid wood products industry consists mostly of very small operators, each has specialized in converting select species. Principally, Taiwanese cedar converters cut to meet the Japanese market. With domestic supplies no longer available, these cedar converters could learn to process Alaskan supplies if the appropriate industry-to-industry communications are established. Since these converters have always relied on domestic supplies, they have limited experience in international trade or use of Pacific Coast cedar. Increased market penetration by Alaskan cedar suppliers will require US investment in disseminating information on product availability, suppliers, financing and containerized shipment.

RESULTS OF TLMP IMPLEMENTATION

CURRENT TIMBER PROGRAM POLICY

Neither the Tongass Land Management Plan (TLMP) nor the Alaska National Interest Lands Conservation Act (ANILCA) section 705(a) provided flexibility for supplying timber under varying market conditions. Starting in 1982, this lack of flexibility caused the Forest Service to prepare timber that it could not sell, since depressed timber markets created a drop in demand for National Forest timber products (GAO Report, 1988). The depressed markets resulted from a decline in housing starts in Japan, decreased demand for dissolving pulp, and increased round log exports from Native corporations. In response to the lower demand for Tongass timber between 1982 and 1986, the Forest Service has modified its timber harvest and roading policies. The objective of the timber sale program is to balance timber supply with the anticipated needs of purchasers, including construction of public roads and facilities.

The current policy for timber sales is to base offerings on harvest levels for the previous year with adjustments for anticipated changes in the market for forest products. Roads are designed and constructed just in time to execute timber harvest.

To further reduce cost during the period of depressed timber markets, four additional timber sale design policies were implemented.

1. Utilization standards could be temporarily changed to allow more flexibility in disposing of lower quality timber.

2. Emergency stumpage rate redeterminations could be made on existing timber sales per existing contract provisions or the provisions of the Federal Timber Contract Payment Modification Act.

3. More better-than-average timber could be made available for harvest as long as the total sold or released was no more than allowed in the Forest Plan.

4. The total volume of individual timber sales could be reduced to lower bonds and reduce purchasers' interest payments.

These measures have aided recovery of the industry (see Table 3-135). Harvest in fiscal year 1988 increased 18 percent over fiscal year 1987. Over the same period, the volume under contract plus volume remaining in the long-term sale operating plans fell by 18 percent. Stronger markets and adjustments in timber sale offerings improved the proportion between the number of sales offered, sold or released, and harvested. The majority of the timber offered and unsold during the depressed timber market period has been reoffered and sold (Supply and Demand Reports, 1987-1988).

UTILIZATION STANDARD CHANGES

In 1979 timber utilization standards were modified from the utilization standards used in the yield calculation for the Tongass Land Management Plan. The maximum stump height was reduced and the minimum tree diameter was lowered from twelve inches to nine inches. This change has decreased overall sale value, since there is an increased cost to harvest the smaller trees, however, utilization of the wood has improved. The increased volume has offset the higher cost.

Between fiscal years 1984-1988, due to depressed timber markets, the minimum piece size left on the sale was changed. Utilization standards which required removal of pieces with more than 10 board feet volume were temporarily changed to allow pieces with less than 30 board feet to be left in the woods, and pieces with less than 50 board feet to be left at the sale landings. On existing sales, where purchasers requested this change, the government raised current contract rates to cover the loss of volume. On new sales, the reduced costs were included in the appraisal.

In 1985, the minimum top diameter on western red-cedar and Alaska-cedar was increased from six inches to ten inches. This waiver was lifted in fiscal year 1988.

The current utilization requirements are the same as those specified in the Revision forest-wide direction. A review of the utilization changes indicated that they tend to be offsetting (Tongass Land Management Plan Amendment 1985-86). No adjustments were made in the Tongass Land Management Plan.

PRECOMMERCIAL THINNING

Precommercial thinning involves the thinning of very young stands (usually less than 20 years old) to improve the spacing and species composition, to remove surplus, damaged or diseased trees, and to optimize the growth of the remaining trees until the next harvest cycle. The enhanced growth increases the expected timber board foot volume at the next harvest cycle. This in turn increases the future timber inventory and allows for raising the current harvest level. This increase in the current harvest level is often referred to as the "Allowable Cut Effect" (ACE).

In developing the Tongass Land Management Plan, it was estimated that the allowable sale quantity (ASQ) could be raised by 34 million board feet per year by thinning 6,300 acres annually. Subsequent tests of the ACE indicate that, if anything, the effect gained from thinning is more than that estimated by TLMP.

The acres of timber stand improvement (which is primarily precommercial thinning) have averaged 6,303 acres per year from 1980-1989. The ANILCA Tongass Timber Supply Fund became available in 1981 (see Table 3-127). The Forest Plan goal and ANILCA funding objective for the allowable cut effect has been met.

TIMBER SALE ACCESS

Road construction is necessary to access most timber sales on the Tongass National Forest. The most common method of funding road construction is for the timber purchaser to construct roads necessary to access the timber. The other method is for the Forest Service to construct roads through a public works contract for low economic sales. The Tongass Land Management Plan anticipated that both methods would be used.

A part of the ANILCA Tongass Timber Supply Fund (TTSF) and the Forest Plan goal was to access timber that was not economically as good as the average timber provided to the industry prior to Tongass Land Management Plan allocations. Two factors reduced the economic viability of some of the timber offered. The first factor was the wilderness designations (which reduced the amount of timber available). The second factor was the implementation of TLMP prescriptions which met management objectives of other resources. The prescriptions required additional timber access costs to mitigate the timber harvest and roading effects to other resources.

Pre-roading Cost-share Augmentation

The Forest Service assists in offsetting the added costs to the timber industry of harvesting timber which is of lower-value and/or more expensive to access by using federal funds to construct roads. Public works construction is often referred to as "pre-roading" when done in advance of timber sales. Federally funded roads also include sharing the cost of road construction with the timber purchaser. Augmentation of road construction costs is done after short-term sales are sold or is estimated at the beginning of each 5-year operating period for long-term sales (ANILCA Supply and Demand Report, 1987).

The Tongass Land Management Plan estimated that approximately 46 miles of preroading and 152 miles of purchaser constructed roads would be required annually to meet the average timber sale goal of 450 million board feet per year (ANILCA Status of the Tongass National Forest, 1985). Since fiscal year 1981 (the first year ANILCA Tongass Timber Supply Funds were available), an annual average of 47 miles of public works construction or reconstruction has been financed. During that same time period, an annual average of 97 miles of purchaser construction or reconstruction has been obligated (ANILCA Timber Supply and Demand Draft Report, 1988). The decrease in total construction reflects the fact that an average of 400 million board feet per year has been sold compared to the TLMP's goal of 450 million board feet per year.

Industry has suggested that the use of the Tongass Timber Supply Fund should include funding of all roads accessing timber not economically viable during periods of depressed markets. The Forest Service has taken a position that the government cannot, without statutory authority, waive contractual rights or modify an existing contract that would result in a net loss to the government. A General Accounting Office (GAO) review of the Tongass timber provisions concluded that no agent of the government can modify existing contracts to the detriment of

the government without authority of Congress. The GAO report also concluded that, for future contracts, the Forest Service had no obligation to supply profitable timber under existing market conditions. The timber supply need only be profitable under market conditions present when ANILCA was passed. This maintains the Forest Service position that ANILCA did not guarantee a profit regardless of market conditions (GAO Report, 1988).

The current policy is to design and construct roads just in time to execute timber harvest. For the most part, roads that qualify for public works are constructed after the sale is sold (augmentation) for short-term sales or for harvest units scheduled for harvest for long-term sales. In recent years, most of the new road construction has been funded by timber sales through purchaser credits (i.e., built by the purchaser and credited to rather than funded through public works (ANILCA Timber Supply and Demand Draft Report, 1988).

ADVANCED LOGGING TECHNOLOGY

The Forest Plan estimated that a portion of the annual allowable sale quantity of 450 million board feet would come from sales that required advanced logging technology. Harvest systems included helicopter, balloon, multispan skyline, and singlespan skyline with reaches greater than 2,600 feet. An annual total of 18 million board feet was estimated from these types of sales. Research to develop new logging technology was to be funded through TTSF (Tongass Timber Supply Funds).

A limited amount of volume has been harvested on the Tongass with advanced harvest systems (skyline and balloon); the volume anticipated in the TLMP has not been achieved. This condition will continue as long as demand can be met from the portion of the ASQ not requiring advanced technologies (ANILCA Status of the Tongass National Forest, 1985).

Advanced logging applied research has been implemented including:

1. Low pressure tires on logging trucks to reduce design and maintenance of logging roads.

2. Geotextiles used on the roadbed to improve drainage, increase stability, and decrease the amount of crushed rock needed.

3. Development of suitable anchors, both stump anchors and rock anchors, to safely operate logging equipment.

4. The use of specially developed equipment (Menci-muc) to facilitate stream crossings.

5. The development of a logging systems/transportation analysis computer program (Net4T) to assist in analysis of cost-effective logging systems, including access.

6. Use but failure of the Washington 118 running skyline systems.

CHANGES IN LAND BASE

National legislation has changed the land base available for timber harvest since the Tongass Land Management Plan.

The Alaska National Interest Lands Conservation Act of 1980 (ANILCA) added approximately 1,394,000 net acres to the Tongass National Forest from public domain. These additions have only a small amount of suitable timberland.

The Alaska Native Claims Settlement Act of 1971 (ANCSA) authorized the transfer of National Forest lands in Alaska to Native regional and village corporations. The Forest Plan excluded 575,000 acres tentatively selected from the land base used for calculating the allowable sale quantity. The current selections on the Tongass total approximately 500,000 selected and 50,000 acres encumbered (not included in the yield calculation). This net gain to the Forest is 25,000 acres.

The Alaska Statehood Act of 1958 authorized the State of Alaska to select up to 400,000 acres from National Forests in Alaska. The TLMP identified approximately 150,000 acres. Current status records indicate that about 180,000 acres have been approved as of 1988. This is a net Forest reduction of 30,000 acres.

An adjustment of 15 million board feet per year was applied to the original yield calculation in the Forest Plan. This reduction was in anticipation that Native corporations with selection rights on Admiralty Island would select Forest Service lands in other locations. The off-Admiralty selections were designated in ANILCA Section 506. These selections resulted in a reduction in the allowable sale quantity of approximately 5.7 million board feet per year. The remaining 9.3 million board feet of the original calculation is available to absorb the impacts of additional State and Native selections (ANILCA Status of the Tongass National Forest, 1985).

Both State and Native selections on the Tongass National Forest will continue into the 1990's (ANILCA Status of the Tongass National Forest, 1987). Currently, Native land exchanges for National Forest lands are being considered in several locations. These exchanges include both surface and subsurface rights. Final acquisition of cemetery and historical sites by Sealaska will require land base adjustments in the future.

SMALL BUSINESS TIMBER SALE PROGRAM

In 1977 the Forest Service began setting aside 80 million board feet of timber annually in short-term timber sales for small business. These sales were intended to promote opportunities for small timber businesses and are free of competition from large firms. Under the Small Business Association (SBA) set-aside timber program, timber sales are targeted for small businesses with no more than 500 employees. This program is part of the short-term timber sales program which represents approximately 150 million board feet annually available from the Tongass National Forest. The remaining 300 million board feet per year represent the two long-term 50-year timber sale contracts.

Since 1980 an average of about 95 million board feet per year has been offered annually through the SBA program. Between 1980 and 1987, about 53 million board feet of timber per year has been purchased through the SBA set-aside program. About half of the timber sold is of sufficient quality to manufacture into cants or lumber, while the remaining timber is sold as pulplogs (ANILCA Status of the Tongass National Forest, 1987).

DEFICIT AND BELOW COST TIMBER SALES

Deficit sales are those in which timber receipts do not cover logging costs. Below-cost sales are those in which the income generated by all facets of use (timber volume, employment, recreational use of roads, etc.) does not cover the cost of selling the timber. Since 1980, many of the short-term timber sales offered on the Tongass National Forest have been deficit sales. Despite the deficit appraisals, many of the sales offered are sold for a variety of reasons. As a result of deficit timber sales being sold on the market, deficit appraisals are not a consistent standard for judging the viability of timber sales. Some

operators may be willing to accept lower profit margins. Others may believe they can operate more efficiently than an average operator on which the appraisal was based. Operators may be speculating that the future value of timber will increase, or they may believe the appraisal estimates are incorrect. Deficit sales may also be used as collateral to secure loans, and they pose a lower risk to timber purchasers in the event that the sales must be turned back to the government. In recent years an improved timber market, has started a reversal in the trend toward deficit sales.

Both public and private sectors raised concern as a result of the Forest Service practices offering deficit and below cost timber sales. As a result of this concern, the General Accounting Office (GAO) of the United States reviewed 3,244 timber sales made during the 1981 and 1982 fiscal years in the Forest Service's four western regions (GAO/RECD-84-96). GAO recommended that the Forest Service develop the capacity to systematically determine the cost of selling timber for all national forest timber sales, and on a statistically valid basis compare these costs with the estimated value to be received from the sale. GAO also recommended that Congress require the Secretary of Agriculture to revise annual reporting to Congress on Forest Service activities to include an estimate of the number and volume of timber sales sold below cost, the amount lost on these sales, and the justification on a primary basis for making such sales.

To critics of the Forest Service, below-cost sales are a symbol of what they perceive as the dominance of timber production in national forest management to the detriment of other resources, uses and values. The national forests were established to provide a host of benefits to the American people, most of which are provided free or at a low price, and not primarily to generate income for the federal government. The Multiple-Use Sustained Yield Act of 1960 made it clear that the national forests were not to be managed to return a profit; the forests were to be managed for all resources and uses, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output. When all programs are considered, the cost of administering the National Forest System has consistently exceeded receipts from the sale of commodities and services. On the other hand, overall receipts from the sale of timber have exceeded the costs of national forest timber program (Shands and Waddell, 1988).

At the direction of Congress and after more than two years of work in cooperation with the General Accounting Office (GAO), the Forest Service in 1987 unveiled its new Timber Sales Program Information Reporting System (TSPIRS). TSPIRS features three different accounts: a one-year cash-flow "financial" account' a longer-term timber "economic" account, and an "employment, income and program level" account which provides information on timber jobs, income, payments to counties, sales, harvests, acres regenerated, and roads built (R10-MB-49).

Though some of its accounting methodology has been challenged, the financial report recommended by the GAO should establish a standard approach to cash-flow analysis of the costs and returns from Forest Service timber sales. Further, each forest will be required to account for costs and revenues from sales intended to produce timber and sales primarily intended to benefit other resources. Since this presumably will be based on an evaluation of individual sales, the economic efficiency of a national forests timber sale intended to provide timber for commercial use can be determined with precision. Similarly, the financial report can also be used to evaluate the use of timber sales to benefit other resources.

FEDERAL TIMBER CONTRACT PAYMENT MODIFICATION ACT

The Federal Timber Contract Payment Modification Act was signed into law on October 16, 1984. The objective of the Act was to provide some relief to National Forest timber purchasers whose bids on sales in high demand periods were not financially viable after the world-wide downturn in the timber market. These purchasers faced large financial losses. Of special importance to Alaska is Section 4 of the Act, enabling purchasers of short-term timber to receive emergency rate redeterminations. Prior to the Act, rate redeterminations were not available for timber sale contracts less than seven years in length. Qualifying short-term timber purchasers were provided opportunities to have the original stumpage rates reappraised, thereby lowering the amount owed to the government. Only those sales sold between January 1, 1974 and July 31, 1985 qualified for the emergency rate redeterminations. Revised rates were to apply to volume harvested and scaled between January 1, 1981 and October 15, 1989.

The Forest Service has determined that about 563 million board feet of timber qualify for rate redetermination. Qualified purchasers have requested redeterminations on 558 million board feet . Refunds of over 2.9 million dollars have been made to purchasers for current and past harvests. An additional 4.0 million dollars in reduced returns to the government may result for sales that were eligible in 1989.

Purchasers of 168 sales in Southeast Alaska had been notified by September 1987 that their sales qualified. Fifty-two timber purchasers have subsequently requested the rate redeterminations, affecting 152 timber sales. Through September 1987, a total of 2.9 million dollars had been refunded to qualified purchasers. No additional rate redeterminations are anticipated (ANILCA Status of the Tongass National Forest, 1987).

LONG-TERM CONTRACTS MODIFICATIONS

Timber harvest under the long-term contracts is done under five-year operating plans, which establish rates and areas to be harvested. The National Forest Management Act of 1976 required that in developing the operating plans, the long-term contracts must be modified to bring them into conformance with the standards and guidelines of applicable land and resource management plans (NFMA Section 15). For the Ketchikan Pulp sale, the 1979-1984 operating period was the first opportunity to modify the contracts. The 1981-1986 operating period for the Alaska Pulp Corporation was used to modify that contract.

Ketchikan Pulp Company modifications made in 1979 include:

- Guidelines for selection of harvest units, operating area maps and overall operating plans.
- Reservations of timber for other resource protection consistent with standards and guidelines of applicable land and resource management plans.
- Forest Service requirement to issue logging and construction approval notices with detailed requirements before operations begin on individual harvest units or road projects.
- Clarification of what erosion control work is to be done.
- Precautions to prevent pollution of air and water by purchaser's operations on the sale area.
- Specific requirements for stream course protection measures during harvest snd road construction operations.
- Protection of cultural resources.
- Clarification of duties of forest officer with regard to suspension of operations.

Alaska Pulp Corporation modifications made in 1982 include:

- Reservation of timber for resource protection consistent with standards and guidelines of applicable land and resource management plans.
- Partial cutting where appropriate and as designated by the Forest Service.
- A life of sale plan.
- Forest Service requirement to issue logging and construction approval notices with detailed requirements for operation before logging or construction begins.
- Clarification of erosion control methods.

RECENT CHANGES WITH APC CONTRACT

On September 11, 1989 the Forest Service announced major changes in the Alaska Pulp Corporation Long-Term Contract, as a result of public and Congressional concerns. Changes were brought about by bilateral and mutually acceptable negotiations between the Alaska Pulp Corporation and the Forest Service. The significant changes of the contract were:

1. Allowances for arranging harvest units in smaller areas, equivalent to a series of smaller sales, instead of the five-year operating plans that are in existence today. A series of smaller timber sales would be planned and offered on a sustained basis rather than one five-year plan containing all the timber for the period. Resulting from this action, the Forest Service would be responsible for pricing stumpage on the individual sales on a more timely basis.

2. Stumpage rate adjustments would be changed to allow upward rate modifications when market conditions warrant such action by the Forest Service. Past contract language has only allowed decreases in contract stumpage rates.

3. Base timber stumpage rates for utility logs, those logs which are not of high-enough quality to make lumber but are usable for pulp, will be doubled.

4. Contract language will clearly state that the Forest Service will be responsible for the selection of timber to be harvested from the National Forest and not APC.

5. Timber designated and made available for harvest will be harvested before new timber is identified. Designated timber can not be substantially deferred for later harvest by APC as has been done in the past.

6. Contractual limits on reserving timber from harvest will be eliminated from the existing contract (Source: Forest Service News release, September 11, 1989, Forest Service Announces Major Changes In Long-Term Logging Contract).

EXISTING DIRECTION LEGISLATIVE

The following section includes quotations from pertinent legislation affecting the timber sale program on the Tongass National Forest.

Multiple-Use Sustained-Yield Act

Multiple-Use Sustained-Yield Act (P.L. 86-517, Act of 12 June 1960)
Sec. 2: The Secretary of Agriculture is authorized and directed to develop and administer the renewable surface resources of the national forests for multiple use and sustained yield of the several products and services obtained therefrom. In the administration of the national forest due consideration shall be given to the relative values of the various resources in particular areas. The

establishment and maintenance of areas of wilderness are consistent with the purposes and provisions of this Act.

Sec. 4(a): "Multiple use" means the management of all the various renewable surface resources of the national forests so that they are utilized in the combination that will best meet the needs of the American people; making the most judicious use of the land for some or all these resources or related services over areas large enough to provide sufficient latitude for periodic adjustments in use to conform to changing needs and conditions; that some land will be used for less than all of the resources; and harmonious and coordinated management of the various resources, each with the other, without impairment of the productivity of the land, with consideration being given to the relative values of the various resources, and not necessarily the combination of uses that will give the greatest dollar return or the greatest unit output.

ANCSA

ANCSA (P.L. 92_203, Alaska Native Claims Settlement Act of 18 Dec. 1971)
Sec. 15, Timber Sale Contracts: Any National Forest timber sale contracts that are directly affected by the conveyance of lands authorized by this act are to be modified to the extent practicable. Equal value of lands are to be substituted for lands conveyed. Similar species composition, volume and grades are to replace those lands that have been affected by the conveyances. Such substitutions are to be made by the Secretary of Agriculture through the timber sale contract without consent of the timber purchaser.

NFMA

National Forest Management Act of 1976 (NFMA, P.L. 94-588, Act of 22 October 1976)
(Note: The National Forest Management Act of 1976 amends the Renewable Resource Planning Act of 1974 in several sections as well as introduces new language through the NFMA. Specifically the NFMA amends sections 2-11 of the Resource Protection Act and adds sections 13-16.)

Sec 6(g)(6)(E): During the development of forest management plans, the Secretary shall insure that timber will be harvested from National Forest System lands only where--

(i) soil, slope, or other watershed conditions will not be irreversibly damaged;
(ii) there is assurance that such lands can be adequately restocked within five years after harvest;
(iii) protection is provided for streams, streambanks, shorelines, lakes, wetlands, and other bodies of water from detrimental changes in water temperatures, blockages of water courses, and deposits of sediment, where harvests are likely to seriously and adversely affect water conditions or fish habitat; and
(iv) the harvesting system to be used is not selected primarily because it will give the greatest dollar return or the greatest unit output of timber; and

(F) insure that clearcutting, seed tree cutting, shelterwood cutting, and other cuts designed to regenerate an even-aged stand of timber will be used as a cutting method on National Forest System lands only where--

(i) for clearcutting, it is determined to be the optimum method, and for other such cuts it is determined to be appropriate, to meet the objectives and requirements of the relevant land management plan;
(ii) the interdisciplinary review as determined by the Secretary has been completed and the potential environmental, biological, esthetic, engineering, and economic impacts on each advertised sale area have been

assessed, as well as the consistency of the sale with the multiple use of the general area;
(iii) cut blocks, patches, or strips are shaped and blended to the extent practicable with the natural terrain;
(iv) these are established according to geographic areas, forest types, or other suitable to be cut in one harvest operation, including provision to exceed the established limits after appropriate public notice and review by the responsible Forest Service officer one level above the Forest Officer who normally would approve the harvest proposal; Provided, that such limits shall not apply to the size of areas harvested as a result of natural catastrophic conditions such as fire, insect and disease attack, or windstorm; and
(v) such cuts are carried out in a manner consistent with the protection of soil, watershed, fish, wildlife, recreation, and esthetic resources, and the regeneration of the timber resource.

Sec. 6(m)(1): The Secretary shall establish standards to insure that, prior to harvest, stands of trees throughout the National Forest System shall generally have reached the culmination of mean annual increment of growth (calculated on the basis of cubic measurement or other methods of calculation at the discretion of the Secretary): Provided, That these standards shall not preclude the use of sound silvicultural practices, such as thinning or other standard improvement measures: Provided further, That these standards shall not preclude the Secretary from salvage or sanitation harvesting of timber stands which are substantially damaged by fire, windthrow or other catastrophe, or which are in imminent danger from insect or disease attack; and
(2) exceptions to these standards for the harvest of particular species of trees in management units after consideration has been given to the multiple uses of the forest including, but not limited to, recreation, wildlife habitat, and range and after completion of public participation processes utilizing the procedures of subsection (d) of this section.

Sec. 13: NFMA limits the removal of timber from any National Forest to a quantity equal to or less than a quantity which can be removed from such forest annually in perpetuity on a sustained-yield basis. Departures from the established annual sale quantity may be done provided that multiple use management objectives are met, public participation in the decision is done and that the harvest rate in any decade is balanced to the quantity limitation for that decade.

In the event of catastrophical occurrences, the annual sale quantity may be overriden for the sake of salvage or sanitation harvesting due to fire, windthrow or insects and diseases. Timber removed in the salvage operations may be substituted for other planned sales provided that that removal of the salvage volume is feasible.

Sec. 14: Timber may be sold off National Forest Lands provided:

All advertised timber sales shall be designated on maps and a prospectus shall be available to the public and interested potential bidders.

The length and other terms of the contract shall be designed to promote orderly harvesting consistent with the principles set out in section 6 of the Renewable Resources Planning Act of 1974.

All sales will be advertised over $10,000.00 in value and if after advertisement a sale is not sold then it may be offered and sold without further advertisement.

In the sale of timber from National Forest lands the Secretary of Agriculture will insure:

a. Open and fair competition
b. That the government will receive not less than the appraised value
c. Consider the economic stability of communities whose economies are dependent on such national forest materials, or achieve such other objectives deemed necessary

In the event a sale is sold through oral auction, a written and sealed bid will be required from each purchaser before the purchaser may participate in the auction proceedings.

The monitoring of bidding practices on the National Forest sales so as to be watchful for collusive bidding practices.

Designation, marking when necessary and to supervise the harvest of timber. Such supervision will be done by an employee of the government and have no interest in the purchase or harvest of such timber.

Utilization standards, methods of measurement and harvesting practices of timber provide the optimum practical use of the wood material.

Sec. 16: A portion of the moneys received through stumpage payments for timber sales will be forwarded to the state in which they were received for the use of schools and roads. The NFMA amends the Act of May 23, 1908 to provide further clarificaiton of this payment to the states.

ANILCA

ANILCA (Alaska National Interest Lands Conservation Act(P.L. 96-487, Act of 2 December 1980)

Sec. 705(a): The Congress authorizes and directs that the Secretary of the Treasury shall make available to the Secretary of Agriculture the sum of at least $40,000,000 annually or as much as the Secretary of Agriculture finds is necessary to maintain the timber supply from the Tongass National Forest to dependent industry at a rate of four billion five hundred million foot measure per decade. Such sums will be drawn from receipts from oil, gas, timber, coal and other natural resources collected by the Secretary of Agriculture and the Secretary of Interior notwithstanding any other law providing for the distribution as such receipts: Provided, That such funds shall not be subject to deferral or recisission under the Budget Impoundment and Control Act of 1974, and such funds shall not be subject to annual appropriations.

Sec. 706(a): The Secretary is directed to monitor timber supply and demand in southeastern Alaska and report annually thereon to the Committee on Energy and Natural Resources of the Senate and the Committee on Interior and Insular Affairs of the House of Representatives. If, at any time after the date of enactment of this Act, the Secretary finds that the available land base in the Tongass National Forest is inadequate to maintain the timber supply from the Tongass National Forest to dependent industry at the rate of four billion five Hundred million foot board measure per decade, he shall include such information in his report.

(b) Within five years from the date of enactment of this Act and every two years thereafter, the Secretary shall review and report to Congress on the status of the Tongass Ntional Forest in southeastern Alaska. This report shall include, but not be limited to (1) the timber harvest levels in the forest since the enactment of this Act; (2) the impact of wilderness desegnation on the timber, fishing, and tourism industry in southeast Alaska; (3) measures instituted by the Forest Service to protect fish and wildlife in the fores; and (4) the status of the small business set aside program in the Tongass Forest.

OTHER DIRECTION

Regulatory and administrative direction affecting the Tongass timber sale program is described briefly here.

REGULATIONS (CODE OF FEDERAL REGULATIONS - CFR)

A. 36 CFR 219, **National Forest System Land and Resource Management Planning**
These regulations set forth a process for developing land and resource management plans for the National Forest System as required by the Forest and Rangeland Renewable Resources Planning Act of 1974 (RPA). These regulations prescribe how land and resource management planning is to be conducted on the National Forest System lands. The resulting plans shall provide for multiple use and sustained yield of goods and services from the National Forest System in a way that maximizes long term net public benefits in an environmentally sound manner.

Plans guide all natural resource management activities and establish management standards and guidelines for the National Forest System. They shall determine resource management practices, levels of resource production and management, and the availability and suitability of lands for resource management.

B. 36 CFR 221, **Timber Management Planning**
This regulation sets forth direction for:
1. Aid in providing a continuous supply of national forest timber for the use of the public,
2. The principles of sustained yield with due consideration to the condition of the area and timber stands covered by the plan,
3. An even flow of national forest timber in order to facillilitate the stabilization of the communities and of opportunities for employment,
4. Coordination of timber production and harvesting with other uses of the national forest land in accordance with the principles of multiple use management,
5. The establishment of the allowable cutting rate which is the maximum amount of timber which may be cut from the national forest lands within the unit by years or other periods,
6. Approval of such plans by the Chief of the Forest Service.

C. 36 CFR 223, Sale and Disposal of National Forest System Timber
This regulation provides for:

1. The sale and disposal of timber with provisions for the disposal of timber in Alaska under the free use program.
2. The conditions and provisions of timber sale contracts.
3. The suspension and debarment of National Forest timber purchasers.
4. Timber export and substitution restrictions.
5. The federal timber contract payment modification program.

FOREST SERVICE MANUALS (FSM)

A. FSM 1920-Land and Resource Planning
B. FSM 2410-Timber Resource Management Planning
C. FSM 2420-Timber Appraisals
D. FSM 2430-Commercial Timber Sales
E. FSM 2440-Designating, Cruising and Scaling
F. FSM 2450-Timber Sale Contract Administration
G. FSM 2460-Use of Timber Other that Commercial Timber Sales
H. FSM 2470-Silvicultural Practices

FOREST SERVICE HANDBOOKS (FSH)

A. FSH 1909.12-Land and Resource Planning Handbook
B. FSH 2409.12-Timber Cruising Handbook
C. FSH 2409.13-Timber Resource Planning Handbook
D. FSH 2409.15-Timber Sale Administration Handbook
E. FSH 2409.18-Timber Sale Preparation Handbook
F. FSH 2409.22-Timber Sale Appraisal Handbook

ENVIRONMENTAL IMPACT STATEMENTS

A. Southeast Area Guide (August 1977)
The Area Guide provided a foundation and a focus for developing the Tongass Land Management Plan. The Plan included allocations of the total land base to provide the public with a mix of differing land use opportunities. The Tongass land management planning process utilized the issues identified in the Area Guide and defined where combinations of land use opportunities would be made available.

B. Alaska Regional Guide (November 1983)
The primary purpose of the Alaska Regional Guide was to provide national and regional direction to the two National Forests within the Alaska Region for land and resource management planning efforts. The Guide facilitates National Forest planning by providing Regional standards and guidelines for addressing major issues and management concerns and by displaying tentative resource objectives for each National Forest, based on objectives that were assigned to the Region as a whole in the 1980 National RPA recommended Program. While the Guide ensures that a consistent approach to National Forest planning is followed throughout the Region, it allows the individual Forests considerable latitude in their formulation of National Forest Land and Resource Management Plans. The Guide also is intended to help coordinate management of the National Forest System in the Alaska Region with other Forest Service programs (programs that assist private landowners and State and local governments in managing and protecting their forest resources, as well as an extensive forestry research program

C. Tongass Land Management Plan Parts I and II (March 1979)
The TLMP Part I Final Environmental Impact Statement (FEIS) is the management direction for the Tongass National Forest. The issues covered by the TLMP FEIS were basically land allocation, community lifestyles, community stability and jobs, wilderness preservation, Admiralty Island allocation, fish and wildlife protection, aquaculture and minerals development. All of the Tongass National

Forest System Lands were allocated to one of four different land use designations (LUDS). These designations were basically wilderness (LUD I), roadless (LUD II), amenity values (LUD III) and commodity values (LUD IV). The TLMP was intended to stabilize the land management direction for the Tongass over its ten year life and to facilitate an orderly use of the many amenity and commodity values the Tongass National Forest contains.

The TLMP Part II FEIS contains the specific management direction/emphasis descriptions and scheduled management activities for each of the individually named and numbered VCU's. Activities were scheduled for the first and second five-year periods of the plan with a future schedule spanning the following three decades. The scheduled activities of the Management Area, along with the output targets and other aspects of TLMP management direction, provide a foundation for the development of annual integrated multi-resource programs in the program development and budgeting process.

D. Tongass Land Management Plan Amendment (1985-86)

The Tongass Land Management Plan Amendment takes into account changes that have occurred since the approval of the TLMP. These changes include the passage of the Alaska National Interest Lands Conservation Act (ANILCA), the reestablishment of ranger districts, the passage of six annual budgets, and the completion of various NEPA documents.

TRANSPORTATION

OVERVIEW

The main means of transportation in Southeast Alaska is by air and sea. Except for three highway connections to the continental road system at the extreme ends of the panhandle, land transportation is confined to internal isolated road systems. Marine transportation historically has been the major method of moving freight and passengers in Southeast Alaska. During the last three decades, however, air services have developed to serve a growing demand for rapid transportation between communities and the lower 48 States. Within the region, the USDA Forest Service has developed transportation facilities primarily to support timber harvest, recreation access, and protection of forest lands. The island-type geography and generally mountainous terrain of the Tongass National Forest requires all three modes of transportation - air, water, and land.

AVIATION SYSTEM

Air traffic demands in Southeast are met by commercial jet airlines, air-taxis, and helicopters. The communities of Yakutat, Juneau, Sitka, Petersburg, Wrangell, and Ketchikan are served by at least two daily jet aircraft flights year-round. Commuter air services of the type common in the lower 48 states (twin engine aircraft carrying between 18 and 44 passengers) do not exist in Southeast. This is chiefly due to the high level of jet aircraft service provided to all the major communities in the region and the lack of additional communities with sufficient traffic to justify intermediate-sized aircraft (Southeast Alaska Transportation Plan, 1986, State of Alaska).

Apart from jet services, there are a number of scheduled air taxi operations providing service to outlying communities carrying passengers, small freight, and mail. Operators typically provide service with seaplanes in the southern panhandle and wheeled aircraft in the northern panhandle.

Seaplanes can land nearly anywhere on the water and put their passengers and freight ashore, but it is much more convenient to do so using a float or dock. The Forest Service has provided permanent seaplane facilities at seven high use locations throughout the Forest. There are also eight forest development airfields for wheeled aircraft, all in the Yakutat area.

Helicopters are used extensively to transport people and cargo to inland sites. Most landing areas are unimproved, except for safety clearances.

MARINE SYSTEM

Marine corridors are well defined in Southeast Alaska, following the fiords, straits, and passages that intersect the rugged mountains of the mainland and the large islands of the region. The main component of the marine transportation system is the Alaska Marine Highway Ferry System. This operation provides surface links for passengers and vehicles to, from, and within Southeast. Four mainline vessels serve the major communities, with three smaller vessels providing mainly internal feeder services between the smaller communities and the mainline ports. In addition to the Marine Highway, several cruiseship lines provide transportation for tourists during the summer season.

Besides passenger transport, the waterways provide the lifeline of goods which supply the needs of Southeast Alaska residents. Several tug and barge operators carry general cargo-type freight, mostly from Seattle, and distribute it to the region's communities.

The waterways are also extensively used for access to the Forest by local residents, as attested to by the large number of privately-owned recreational vessels. In addition, the waterways make the transportation of the Forest's timber resources to mills and markets possible.

LOG TRANSFER FACILITIES

The methods of getting logs into saltwater for transportation to mills have evolved over several decades. In the early years of timber harvest in Southeast Alaska (1909 to the 1930's), trees were selected so that they would fall or slide directly into the water. As mechanization increased (1940 to 1960), more remote logs were harvested and put into the water with floating A-frame yarders and transfer devices anchored offshore (Faris and Vaughan 1985). Today, most logging is done some distance inland, and logs are yarded to landings along a road system for transport to tidewater. At tidewater, log transfer facilities (LTF's) are constructed to safely and efficiently transfer logs from land to water.

The log transfer facility type is usually a bulkhead or one of several ramp designs. The two common options for handling logs at a saltwater facility are land-to-water (rafting) and land-to-vessel (barging or shipping). A third option is placing the logs in saltwater and then loading from the water onto barges or ships. The vast majority of logs harvested on the Tongass National Forest are rafted.

Logs are sorted upland by species, grade, or intended process. Individual truckloads are normally bundled together using either flat steel bands or wire rope. Bundling makes handling easier and significantly reduces loss of individual logs. At the LTF, bundles are lifted off the log trucks and placed in the water. They are then moved by boom boats into groups of common species and grade until rafts approximately 70 feet x 550 feet have been built. The rafts are then moved to nearby temporary storage sites, towed to winter storage areas, or towed directly to mills.

Log transfer facilities will impact the marine benthic habitat (plants and animals that live in and on the ocean bottom). Effects are expected from two sources: structural embankment (placing rock in the water) and bark deposition (bark that accumulates underwater). All LTF types occupy approximately the same amount of bottom area. Ramp designs extend out into the water but are narrow. Bulkheads do not extend as far into the water but are wider. Thus, each are estimated to cover the same amount of bottom area (approximately 1/4 acre per site).

Site Bark Deposiyion

Two publications exist which describe some of the general effects of LTF's and log storage on the marine benthic habitat. Sedell and Duvall (1985) summarize the information available on the effects of log transport and storage on marine resources and fisheries. Faris and Vaughan (1985) examined log transportation and log storage in Southeast Alaska.

Shultz and Berg (1976) examined 32 existing LTF sites and found that 19 had bark accumulation, eight had no bark accumulation, and five had traces of bark. The extent of bark accumulation ranged from 0 to 9.0 acres for 31 of the 32 sites. The 32nd site had accumulation of 182 acres that could not be solely attributed to log transfer activities. Faris and Vaughan (1985) reexamined the original data from Shultz and Berg (1976) and found that the average accumulation size was 1.96 acres for all sites excluding the 182 acre site. They speculate that bark and debris accumulation may be decreasing over time due to water currents. No

estimate on the length of time before a bark accumulation was completely eliminated was made.

Faris and Vaughan (1985) also examined the extent of total damage to marine benthic habitat in Southeast Alaska. Their results indicate that from the 90 sites permitted at the time, a total of 176 acres would be impacted (using the 1.96 acre average). This is 0.02 percent of the total estuarine area that is less than 60 feet deep. Moreover, when they examined all of the potential area of bark and debris accumulation from all permitted and proposed sites in Southeast Alaska, they found that a total of 317 acres would be impacted. This is 0.09 percent of the total estuarine area that is less than 60 feet deep in all of Southeast Alaska. This result corresponds with the conclusion of Sedell and Duval (1985) that the evidence of damage on important marine populations (bivalves, crabs and salmonoids) was inconclusive because of the small area impacted due to log transfer facilities. This evidence resulted in development of the current siting guidelines, which include avoiding crab habitat and shallow areas at the head of bays, and ensure that impacts will be minimized.

The major effect of bark and debris accumulation is that little neck clams and bay mussels have been shown to be eliminated when as little as 4 to 5 inches of bark accumulates (Freese and O'Clair 1987). Further, Conlan and Ellis (1979) reported mollusks and several polychaetes (marine worms) were excluded by bark debris greater than 2.5 cm in thickness and effects of bark may last several decades. From this evidence, it can be assumed that other plants and animals that live in and on the bottom (the marine benthic habitat) would probably suffer the same fate.

Toxic substances, occurring as leachates from bark, precipitate in saltwater, therefore, leachates do not appear to be a major problem in open water or where good water circulation exists (Sedell and Duval 1985).

Recently, certain dissolved substances (hydrogen sulfide and ammonia) have been shown to occur in open spaces between pieces of bark in an accumulation of bark on the bottom (O'Clair and Freese 1988). It is not clear whether other toxic substances not measured in the study occur within bark accumulations. These substances do not enter the water above the bark. However, if dungeness crabs burrow into the bark deposit, it has been demonstrated that their reproductive ability, eating habits, and overall survival can be affected. It should be noted that this type of effect has been demonstrated in only one bark accumulation field (Rowan Bay log transfer facility) and that, in general, crabs were not found in bark accumulations at a number of other log transfer facility locations. Bark obtained from underwater accumulations at existing LTF locations were used in a laboratory experiment to demonstrate potential effects to dungeness crabs if they were to burrow in bark accumulations (O'Clair and Freese 1988). It is not known whether these effects would occur for other burrowing crab species. Although king crab do not burrow, it is not clear whether this species is affected by bark and debris accumulation at log transfer facility sites.

Raft Storage

The other potential effects associatated with log transfer facilities are from log rafts and log storage in saltwater. The area under a log raft may be affected by bark accumulations with effects similar to, but not as concentrated as, those discussed for LTF's. In addition, if the raft is stored in a bay or cove for a long period of time, marine algae may be affected by shading. Occasionally, rafts stored in shallow depths may ground on the bottom. This

would cause mechanical disruption or compaction of intertidal and subtidal bottom habitats. The effects would not last long, because plants and animals would begin to return shortly after the raft refloated, unless the site was repeatedly used and log rafts frequently grounded. Current guidelines call for raft storage in areas where they will not ground.

LTF Guidelines

Log transfer facility guidelines have changed since the Forest Plan was written. The new guidelines are the result of an interagency task force. The Alaska Timber Task Force created a Log Transfer Committee which further chartered a Log Transfer Facility Guidelines Technical Subcommittee. The final "Log Transfer Facility Siting, Construction, Operation, and Monitoring/Reporting Guidelines" which resulted from this effort were released in October 1985. These guidelines represent the efforts of a wide range of individuals, agencies, organizations, and perspectives.

Section 407 of the 1987 Amendments to the Clean Water Act clarified the roles and responsibilities for the permitting of log transfer facilities. Section 407 directs the Administrator of the Environmental Protection Agency and the Secretary of the Army to enter into an agreement regarding the coordinated permitting of log transfer sites under sections 402 and 404 of the Federal Water Pollution Control Act. The conference committee, in resolving differences between House and Senate versions of the Clean Water Act amendments, recognized efforts in Alaska by stating: "The Memorandum of Agreement between the Department of the Army and the Environmental Protection Agency contemplated by this section was entered into on October 22, 1985. This agreement represents a promising degree of early and continuing cooperation between the agencies and the private sector and a proper reliance on their joint efforts in developing Alaska Timber Task Force Log Transfer Facility Guidelines. The terms and conditions of permits subject to this section are to be implemented and enforced in accordance with the appropriate statutory authority of the respective federal agencies".

These guidelines are listed in the Existing Direction section.

Current Status

The review by Faris and Vaughan (1985) included potential sites on State and private land as well as those anticipated at the time by the Forest Service. An updated summary of the number and status of LTF's on National Forest Land is presented in Table 3-142. Figure 3-48 displays the location of LTF's using the same categories as the table, except that abandonded sites have not been shown due to scale limitations.

TABLE 3-142
INVENTORY OF LOG TRANSFER FACILITIES ON THE TONGASS NF 1/

Type of Facility	Chatham	Stikine	Ketchikan	Total
Existing, functional 2/	13	12	9	34
Existing, need reconstruction 3/	16	6	22	44
Abandoned, no future use 4/	9	9	20	38
Potential new construction 5/	49	38	85	172

Source: GIS database, 11/89. Information on existing LTF's is maintained at each Administrative Area Supervisor's Office. Proposed new development information on 60 sites is from project level design work, including marine investigation. The remaining new sites are the best estimate of the Forest's transportation planners. Abandoned site information was collected from Faris and Vaughan (1985) and personal conversations.

1/ The LTF's tallied above are sited on National Forest uplands. In addition, there are 17 existing sites currently being used or agreements sought for future use on State or private uplands.

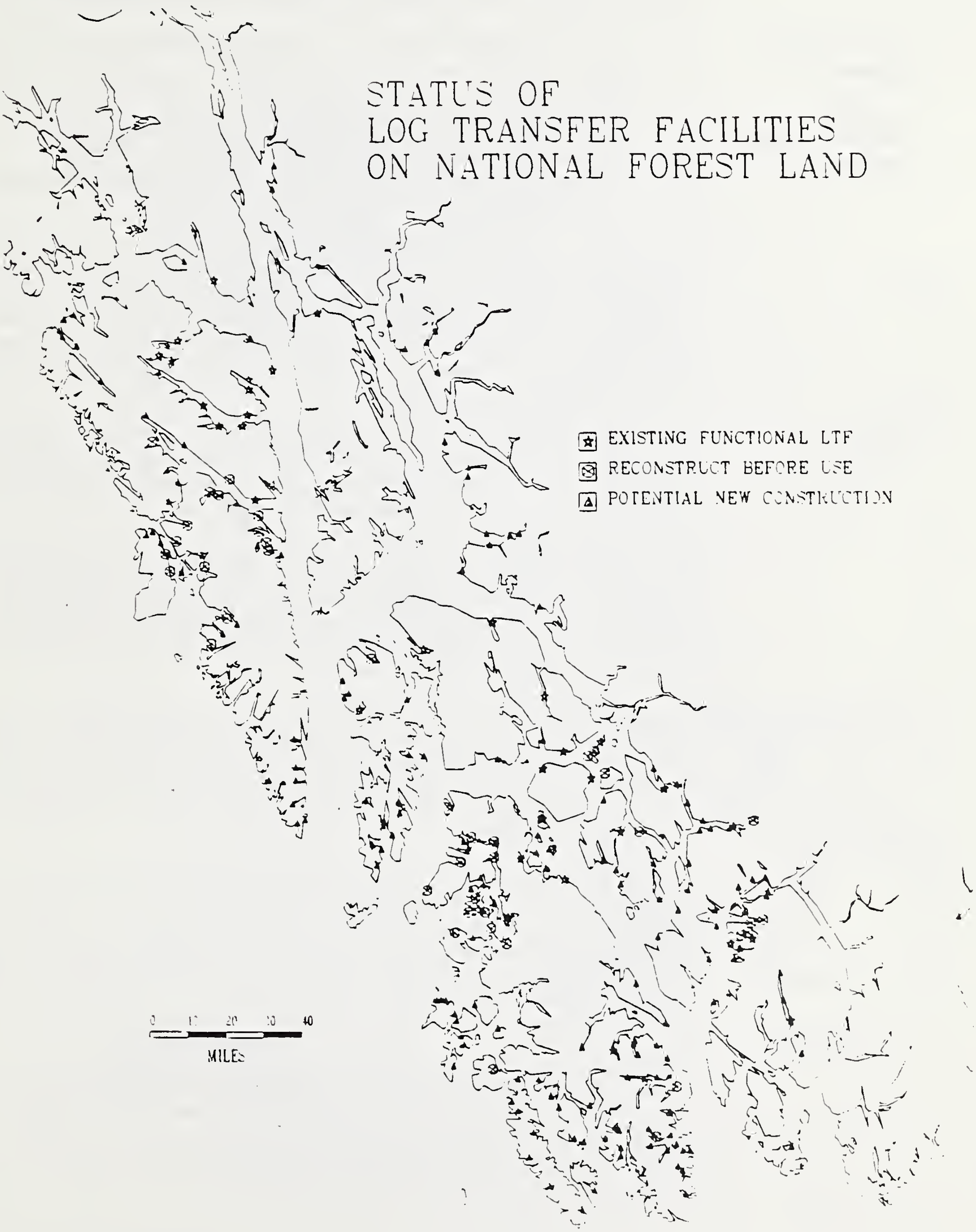
2/ These sites may or may not be currently active, but are maintained. All required permits are current. For permit information see Table 3-117 (Tideland Authorizations held by the Forest Service) in the Lands section.

3/ These sites would need extensive reconstruction before new timber sale use. Some sites included in this category will require the construction of a completely new facility, even though the site had been previously used for log transfer activities. Permits may or may not be current.

4/ These are mostly old sites which had little or no development before use, and transferred small amounts of volume. A few are more recent and are being used as boat landings. No future timber sale use is expected at any of these sites.

5/ Potential new development needed if all tentatively suitable forest land were to be managed for timber (fewer will actually be constructed depending on land allocation).

FIGURE 3-48
LOCATION OF LOG TRANSFER FACILITIES



ROAD SYSTEM

The road system in Southeast Alaska is sharply constrained by steep coastlines, multiple fiords, and mountainous terrain. While there are some potential road corridors within the area, only a limited number have been developed.

SUPPLY AND DEMAND ASSESSMENT

ACCESS TO CONTINENTAL ROAD SYSTEM

Access to the continental road system is currently provided at only three points in Southeast. These public road connections are:

1. The extension of Highway 37A from Stewart, British Columbia to Hyder, Alaska.
2. The Klondike Highway from Whitehorse, Yukon Territory to Skagway, Alaska.
3. The Haines Highway from Haines Junction, Yukon Territory to Haines, Alaska.

Opportunities for access to the Canadian road systems exist along the routes briefly described below. This is an inventory of the physical possibilities for land access. The listing is from north to south within the region. These corridors are displayed in Figure 3-49. Information presented in this section was obtained from the Southeastern Alaska Transportation Plan (DOTPF, 1980), the Southeast Alaska Transportation Plan (DOTPF, 1986) and the Stikine River Region Access Study (Report to Congress, Section 1113 ANILCA, 1986).

Corridor Description

Alsek River. This route would provide a connection from Dry Bay to the Haines Highway via the Alsek and Tatshenshini Rivers. Yakutat could be connected to this system. This route would cross current Land Use Designations (LUD's) II and III, and Glacier Bay National Park and Preserve.

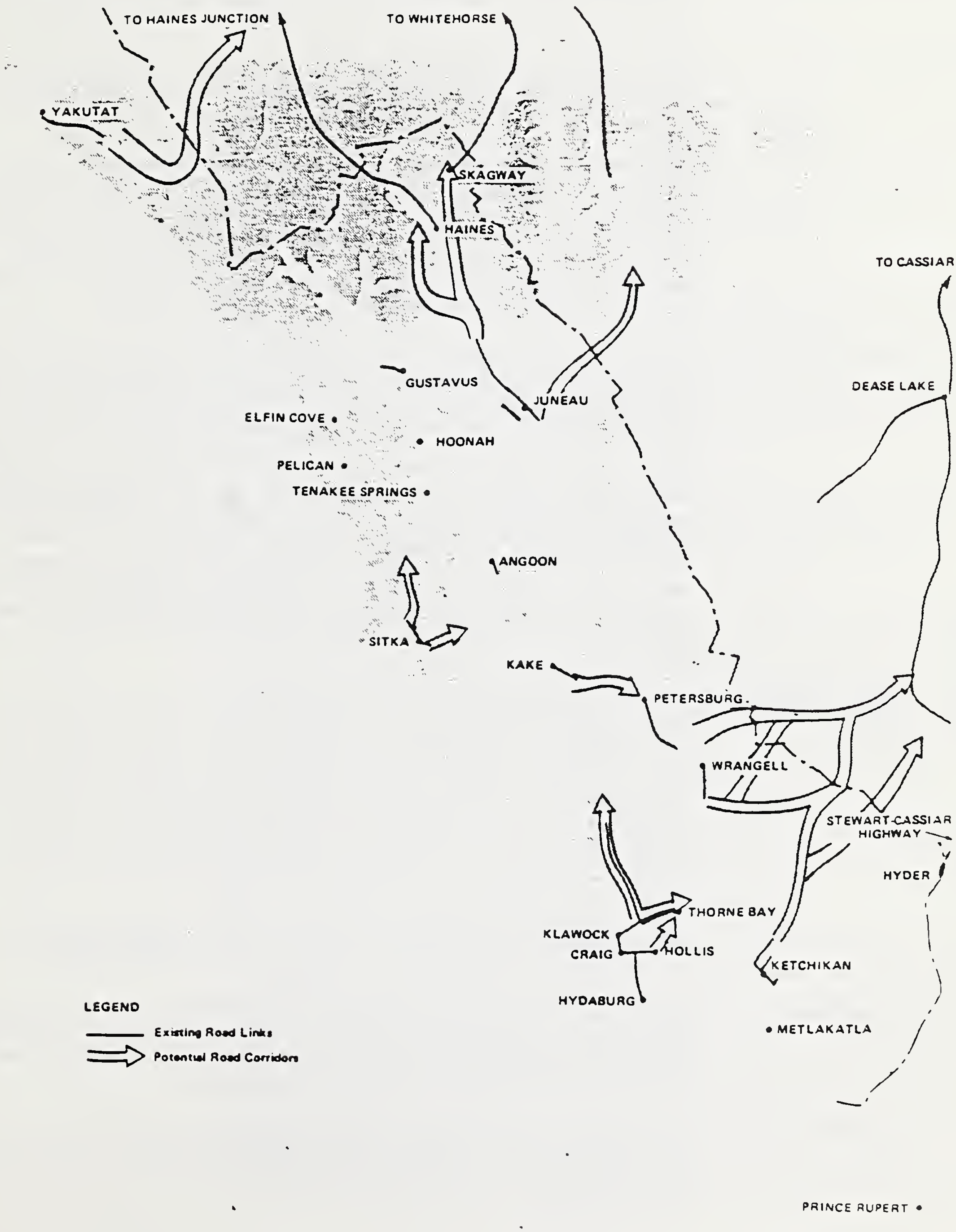
East or West Lynn Canal. This route would connect Juneau with the northern road systems either at Haines or Skagway. The Southeast Alaska Transportation Plan (DOTPF, 1986) identifies seven alternatives for providing surface transportation along this route which include road construction. Four alternatives provide mixes of road and ferry travel. These routes cross both current LUD's II and III, or just III depending on alternative.

Taku Inlet/Taku River. This route would provide a link from Juneau up the Taku Inlet to the Atlin/Mount McMaster Road via the Taku and Nakina Rivers. The Thane Road would be extended up the west side of Taku Inlet to Grizzly Bar. From there, either a bridge or ferry would be used to cross to the east side. The road would continue on the east side to the border. This route would cross current LUD's II and III.

Stikine River. This route would provide access along the Stikine River to the Canadian border. From there it would continue either up the Stikine to the Glenora Road, or up the Stikine and Iskut Rivers to Highway 37. Alternatives B-F of the Stikine River Region Access Study use this route to the border. Wrangell could be connected to this system either by road or a local ferry. Petersburg could be connected by local ferry. This route would cross the Stikine-Leconte Wilderness Area.

Aaron Creek/Katete River. This route would provide access to the border by way of Aaron Creek and the Katete River. From there it would continue either up the Stikine to the Glenora Road or up the Stikine and Iskut Rivers to Highway 37. Alternative A of the Stikine River Region Access Study uses this route to the border. Wrangell could be connected to this system, either by road or a local ferry. This route would cross current LUD's II and IV.

FIGURE 3-49
EXISTING ROAD LINKS AND POTENTIAL ROAD CORRIDORS



Bradfield River/Craig River. This route would provide access to Highway 37 by way of the Bradfield, Craig, and Iskut Rivers. Alternative G of the Stikine River Region Access Study uses this route to the border. Wrangell could be connected to this system by local ferry; Ketchikan, by road. This route would cross current LUD's II and IV.

Burroghs Bay/Unuk River. This route would provide a connection from Ketchikan to Highway 37 via Burroughs Bay and the Unuk River. This route would cross current LUD's II, III, IV and Misty Fiords National Monument.

Currently, demand for access to tidewater in Alaska has been sparked by successful gold mining activity in Northwestern British Columbia. There is a proposal to haul Canadian ore to tidewater near Wrangell. The route getting most attention at this time is the Bradfield River/Craig River corridor. The Alaska State Legislature has recently appropriated $150,000 to study this road proposal. The Forest Service has previously approved the location of a powerline from the Tyee hydropower site along this same route to Canada.

Internal Ties

Whether a community desires to be connected by road, or by the Alaska Marine Highway, to other communities often generates major debates within the region and within individual communities. Some communities have clearly agreed they do not desire road access; opinions within other communities vary. Within the region, only Prince of Wales Island has a road system which interconnects communities. While not proposing current development, the State of Alaska, in its Southeast Alaska Transportation Plan (DOTPF, 1986), has identified three major internal road corridors which could materially affect the pattern of Marine Highway operations. These are the Sitka to Baranof or Rodman Bay tie, the Kake to Petersburg connection, and upgrading of the Prince of Wales road system from Control Lake to Red Bay. In addition an internal tie road along the Eagle River could be used to connect Ketchikan to the Bradfield River/Craig River road if it were ever to be constructed. All these internal ties are depicted in Figure 3-49.

FOREST DEVELOPMENT ROADS

Forest development roads (forest roads under the jurisdiction of the Forest Service) are constructed to provide access to National Forest lands for their use, administration, and protection. As management of National Forest Lands in most situations is for multiple use, any development road constructed serves more than one resource. Most of the existing forest development road system was constructed primarily to provide access for timber harvest. This access is now available for silvicultural activities, wildlife and fisheries habitat improvements, recreation, subsistence use, and improved protection capabilities.

Forest roads are functionally classified as arterial, collector, or local. These classifications are not absolute, but are related to land area, mobility and travel efficiency, land and resource management purpose, and service.

Arterials

Arterial roads serve large land areas and usually connect with public highways or other arterial roads to form a network of primary travel routes. Location and standards for these roads are often determined by the need for travel mobility and efficiency rather than by specific resource needs.

Collectors

Collector roads serve smaller land areas and are usually connected to a forest arterial road or public highway. These roads collect traffic from forest local roads. Location and standards are determined by long-term resource needs and travel efficiency.

Locals

Local roads connect terminal facilities, such as log landings and recreation sites, with forest collector roads, forest arterial roads, or public highways. Location and standards are determined by the specific resource needs that the roads serve.

All classes of roads are built to standards appropriate to their planned uses, considering safety, cost of transportation, and impacts on lands and resources. All forest development roads, except for in a few administrative sites and campgrounds, are single lane with native rock surface, designed for off-highway loads. Typical roads designed to minimum standards are 14 feet wide, have a pit run rock surface, and a safe travel speed of 10 mph. High standard roads are normally 16 feet wide, may have a crushed rock surface, and are designed for a safe travel speed of up to 30 mph. Travel speed on lower standard roads is often controlled more by surface roughness than by alignment or grade.

Construction takes place on terrain that is almost completely composed of soils that will not support heavy equipment. The method of construction is to overlay the soft native material with quarry rock, which is end-dumped from a stable rock embankment to a depth necessary to support the hauling vehicles. The minimum required depth of quarry rock is about 30 inches. Best management practices required in all timber sale and public works contracts are followed to protect water quality (refer to the Existing Direction section below for specific examples).

Cost Share

Primary responsibility for forest development road maintenance rests with the Forest Service, although other owners and users share in the funding and/or actual work performance. The users' requirements are based upon a share, commensurate with their use.

Whenever possible or feasible, the Forest Service avoids duplicating existing or planned road systems by negotiating agreements with parties to share in the costs of a single system to serve all tributary ownerships. The Forest Service has entered into four road right-of-way construction and use agreements with separate landowners to develop road networks to satisfy joint transportation needs. The Forest Service has agreements with Sealaska Corp., Huna Totem Corp., Goldbelt Corp., and Yak-Tat Kwaan Corp. Significant cost savings are realized by both parties as a result of the cost sharing. Cost for the 35.4 miles of road currently built and 5.9 miles of planned construction covered in the four agreements was $9,339,508. Each party's share of the road cost was based on their use of the roads. The Forest Service share was $6,225,297. Forest Service timber planned to go over the cooperative road system was over 2.8 billion board feet. Cooperator volume was just under 1.1 billion board feet.

Forest Highways

When a forest development road provides a connection between communities, serves local needs such as schools and mail delivery, or connects safe public roads and the renewable resources of the National Forests, it can be designated as a forest highway. It may then be upgraded to state highway standards and jurisdiction given to the State. To date, the Alaska Department of Transportation and Public Facilities, the Federal Highway Administration, and the Forest Service have agreed to designate a potential 362 miles as forest highways. Not all of these miles have been constructed as yet--in particular, Forest Highway 40 from Kake to Petersburg. The state is gradually assuming jurisdiction and maintenance responsibility for those that have been constructed. The rate of assumption depends upon Federal Highway funding levels and state funding available for road

maintenance. Jurisdiction and maintenance responsibility has been turned over to the State on 181 miles. Upgrading of Forest Highway 42 to Thorne Bay is nearly complete. Highway access to the remaining communities on North Prince of Wales Island dependent on the Forest Highway system remains inadequate, especially in the winter. The Forest Service does not have the authority to provide public services such as snow removal. Until the state assumes jurisdiction of the rest of the Forest Highway system on Prince of Wales this will remain a problem. In this case, state funding available for road maintenance is the limiting factor.

Current Status

Presently only a small portion of the Forest is in a roaded condition. There are approximately 2,640 miles of existing forest development road. Of these, 14 percent are classified as arterials, 40 percent as collectors, and 46 percent as locals. Much of the existing road (45 percent) is in isolated networks, not connected to communities. These isolated roads were not designed and are not maintained for public use. However, of the approximately 1440 miles connected to communities, 33 percent are maintained for all types of traffic including commercial, recreational, and low-clearance passenger vehicles; and 44 percent are maintained only for commercial and high-clearance passenger vehicles. The remaining 23 percent are either physically blocked for user safety or resource management, or have simply been allowed to grow over. All roads, whether open to traffic or not, receive basic custodial drainage maintenance. This information is further quantified in Tables 3-143, 3-144 and 3-145. Table 3-143 presents some general information on the current roading situation.

TABLE 3-143
TRANSPORTATION SYSTEM DATA

Roading Status:	Units	Quantity	Percent
National Forest Land	acres	16,955,945	100
Tentatively Suitable Land (TSL)	"	3,065,976	18
Roaded National Forest Land	"	1,111,094	of total: 7
Roaded Tentatively Suitable Land	"	721,506	of TSL : 24
Existing Forest Development Road			
Arterials	miles	372	14
Collectors	"	1047	40
Locals	"	1223	46
Total	"	2642	100
Isolated Roads	miles	1201	45
Roads Connected to Communities	"	1441	55
Forest Highways			
Designated	miles	362	100
Under State Jurisdiction	"	181	50

Source: Forest development road miles, Transportation Inventory System, 7/89; Acres, GIS database, 1/90, Forest Highway miles, Federal Highway Administration, 5/13/88

Table 3-144 displays the number of miles of forest development road by functional class and the kind of access provided.

TABLE 3-144
STATUS OF TOTAL FOREST DEVELOPMENT ROAD SYSTEM

Functional Class	Open, All Vehicles	Open, High Clearance	Closed or Blocked	Total Miles
Arterial	292	54	26	372
Collector	317	510	220	1047
Local	64	553	606	1223
Total	673	1117	852	2642
% of Total	26	42	32	100

Source: Transportation Inventory System, 7/89

Table 3-145 presents the number of miles of forest development roads by functional class and kind of access, that are directly connected to communities in Southeast Alaska.

TABLE 3-145
STATUS OF FOREST DEVELOPMENT ROADS CONNECTED TO COMMUNITIES

Functional Class	Open, All Vehicles	Open, High Clearance	Closed or Blocked	Total Miles
Arterial	212	0	9	221
Collector	224	216	66	506
Local	48	415	251	714
Total	484	631	326	1441
% of Total	33	44	23	100

Source: Transportation Inventory System, 7/89

The roads described in Table 3-145 are not readily accessible by all members of the public. Without an interconnected road system, recreational drivers are generally limited to the network of roads accessing the Forest from their community. Some communities are not served by the Alaska Marine Highway ferries, so access to their road systems is even more limited. A description of access to the Forest provided to each community is listed in Table 3-146. The listing is from north to south within the region.

TABLE 3-146
SURFACE ACCESS PROVIDED, BY COMMUNITY

			--------- Forest Development Road Miles --------				
Community	Ferry Service	Forest Highway	Funct. Class 1/	Open (Passenger Car)	Open (High Clearance)	Closed or Blocked	Total
Yakutat	None	FH 10,	A	0	0	0	0
		30 mi.	C	9	19	19	47
			L	1	3	7	12
			Total	10	22	26	58

TABLE 3-146 (Continued)

Juneau	Mainline	FH 2,	A	0	0	0	0
		24 mi.	C	11	0	0	11
		FH 37,	L	5	15	0	20
		1 mi.	Total	16	15	0	31
Hoonah	Feeder	None	A	49	0	0	49
			C	26	9	0	35
			L	21	9	9	39
			Total	96	18	9	123
Sitka	Mainline	None	A	0	0	0	0
			C	7	3	0	10
			L	2	0	0	2
			Total	9	3	0	12
Kake	Feeder	FH 40,	A	15	0	0	15
		2 mi.	C	20	4	0	24
			L	2	3	40	45
			Total	37	7	40	84
Petersburg	Mainline	FH 7,	A	0	0	0	0
		35 mi.	C	46	16	0	62
			L	2	41	18	61
			Total	48	57	18	123
Wrangell	Mainline	FH 16,	A	0	0	0	0
		9 mi.	C	39	8	0	47
			L	0	24	2	26
			Total	39	32	2	73
Prince of Wale Is.	Feeder	FH's 6, 9,13;	A	186	0	9	195
		70 mi.	C	66	124	44	234
			L	13	288	155	456
			Total	265	412	208	885
Edna Bay	None	None	A	11	0	0	11
			C	0	36	3	39
			L	1	28	20	49
			Total	12	64	23	99
Ketchikan	Mainline	FH 39,	A	0	0	0	0
		10 mi.	C	0	0	0	0
			L	1	4	0	5
			Total	1	4	0	5
Hyder	Summer Feeder	None	A	0	0	0	0
			C	0	0	0	0
			L	0	1	12	13
			Total	0	1	12	13

Source: Transportation Inventory System, 7/89

1/ Functional Classes: A - Arterial, C - Collector, L - Local.

Future Development

The size of the road system needed to manage Forest resources depends primarily on the amount of timber harvested. Currently, 76 percent of the tentatively suitable timber land is roadless. If all of this land is managed for timber production, it is estimated that a total forest development road system of 26,000 miles would be needed. If the current forest plan were to be completely implemented it is estimated that a total sytem of 20,100 miles would be needed.

ROAD MANAGEMENT

Until very recently the road management objectives for most areas accessible to the public have included providing access for motorized recreation activities, mainly due to the historic shortage of roads to drive near the communities of Southeast Alaska. This objective was tempered by limited road maintenance funds which led to custodial maintenance of some of the lower standard roads. Some roads were physically blocked or had bridges pulled for safety reasons. Others were simply allowed to grow over with alder.

Since the Forest Plan was written, tie roads have been constructed on North Prince of Wales Island much sooner than anticipated (Tongass Land Management Plan, 1984). This has connected all communties on Prince of Wales, except Kasaan, Point Baker, and Port Protection, to each other and the State ferry system. In addition, the village of Hoonah on Chichagof Island was tied to the road system out of Whitestone Harbor, which itself expanded through long-term sale activities. As a result the two largest population centers of Southeast Alaska (Ketchikan and Juneau) now have easy ferry access to significant forest road systems.

With increased use has come user conflicts, and a concern over road management, particularly, the amount of road open and accessible to the public. The increase of road access is of concern to local subsistence hunters because they must increasingly compete with other hunters, especially for deer. In addition, in the Hoonah area, it is currently thought that road access is the factor with the greatest effect on brown bear habitat capability because of increased man/bear encounters and increased hunting access (Alaska Pulp Corporation Long Term Sale Contract, Draft Supplemental Environmental Impact Statement for the 1980-86 and 1986-90 Operating Periods). Due to these factors, more restrictive road management strategies have recently been adopted on both the Prince of Wales and Hoonah road systems.

It has been suggested for brown bear management that forest road systems be managed for an open road density of 0.75 miles per section (Grizzly Bear Compendium, 1987). While this guideline may not be directly applicable to Alaska, it is cited here to provide a frame of reference. In recreation terms, guidelines call for a total road density (open and closed) of less than 1.0 mile/section to provide a semi-primitive setting.

Without a road closure program it is anticipated that the Prince of Wales system would have an open road density at the end of the 1994 of 1.02 miles/section. The Hoonah system would have an open road density at the end of 1990 of 0.68 miles/section. These figures were obtained by dividing the anticipated road mileage by the total acres of land in the study areas of the two most recent Environmental Impact Statements for the long term timber sale contracts. The road closure program is expected to bring down the densities for the Prince of Wales and Hoonah systems to 0.68 and 0.27 miles/section respectively. The percent of total miles which will be closed in the Prince of Wales system is 34 percent, the Hoonah system, 40 percent.

Most road closures are for local roads, with the main roads that serve large areas of land left open. Areas currently open are generally retained, while many new areas accessed will be closed. In many areas where the roads are closed, bridge construction will utilize modular spans which can be removed and used in other locations following sale operations. Closed roads will remain legally open to travel by hiking.

Off-highway Travel

Because of low population and large expanses of unroaded and relatively inaccessible areas, the situation in Southeast Alaska is different from that found in the lower 48 States. Steep densely vegetated terrain limits the use of typical off-road vehicles (ORV's) such as three-wheelers and all terrain vehicles (ATV's) to beaches, communities, road systems, braided river channels and frozen or snow covered areas. Trails in Southeast Alaska do not lend themselves well to the use of ORV's because of wet ground conditions which often necessitate the use of plank construction designs.

The most prevalent ORV's in Southeast Alaska, although not usually thought of in these terms, are aircraft and motor boats. Registered motorboats are exempted from any prohibitions that may be placed on ORV use (36 CFR 295.2). Other vehicles mainly used are snow machines, all-terrain vehicles (both three and four-wheeled), and airboats.

Forest Service Manual direction (FSM 2350) calls for the designation of all National Forest System lands for off-road vehicle use in one of three categories: open, restricted, or closed. Except in specific areas the Forest Service has not experienced major problems typically associated with ORV's that have been experienced elsewhere. Because of this, the current Forest policy is to close only specific areas to ORV's, with the rest of the Forest remaining open for ORV use.

In practice, Federal Regulations prohibit the use of vehicles off roads "in a manner which damages or unreasonably disturbs the land, wildlife, or vegetative resources" (36 CFR 216.13). Muskegs are extremely susceptible to damage from ORV's when not adequately covered with snow, and should not be operated on otherwise. To actively enforce this prohibition would take a closure order issued in accordance with 36 CFR 261 Subpart B. No sweeping closures of muskeg areas have been issued as yet, but even with such closures, enforcement would be difficult. An educated and responsible public is needed for the protection of this resource. The current situation is this: as the road system expands, previously inaccessible muskegs are now becoming accessible to ORV's and damage is starting to show up. So far the incidents have been isolated and minor, but damage, once it occurs, is long lasting.

Traffic on forest development roads open to public use is subject to all applicable State traffic laws. This includes the same registration and licensing requirements as those necessary on Alaska State roads. For ORV's, this also includes the registration and equipment requirements in Title 5 Chapter 30 of Alaska Statutes and the conditions for use in Alaska Public Safety Regulations (13 AAC 02.455). These regulations basically restrict ORV use to road crossings and use on the right-or-way, except when use by other motor vehicles is impossible. The Forest Service is given the authority to allow snowmobile ATV use under 13 AAC 02.455 (a) (2) and (3):

"(2) when use of the highway by motor vehicles is impossible because of snow or ice accumulation or other natural conditions or when the highway is posted or otherwise designated as being open to travel by off-highway vehicles:

(3) when highway driving is authorized by an authority having jurisdiction over the highway, but only in accordance with restrictions which may be imposed by that authority with regard to highway use."

No forest development road open to public use has been designated as open to ORV use due to the Forest Service's reluctance to assume liability for the safety of the mixed traffic that would ensue. Many of the roads closed to public highway vehicle use may be suitable for ORV designation; however, none are currently designated and posted as being open to ORV use. On the other hand, to enforce a closure for these vehicles, a closure order would be needed (none of these have yet been issued). The Ketchikan Area has decided that closed roads on North Prince of Wales Island will be closed to all forms of motorized vehicles, so closure orders in accordance with 36 CFR 261 Subpart B for this area are forthcoming.

The Chatham Area is currently working on a comprehensive Access Management strategy for the Hoonah road system. Juneau Ranger District's Off-Road Vehicle Travel Plan is currently in effect and has helped reduce user conflicts between snowmobile users and cross-country skiers. On the Stikine Area, one closure order has been issued closing Blind Slough on the Petersburg Ranger District to ORV use. In addition, several trails on the Forest have been closed to motorized vehicles.

EXISTING DIRECTION

The Southeast Alaska Area Guide, the Alaska Regional Guide, and the Tongass Land Management Plan provide existing standards and guidelines pertaining to transportation system development and planning. These are listed below as they appear in Appendix B of the Regional Guide FEIS. In addition to the log transfer facility guidelines in the Area Guide, the Forest Service has adopted the "Log Transfer Facility Siting, Construction, Operation, and Monitoring/Reporting Guidelines" developed by the Alaska Timber Task Force. These Guidelines are also reproduced below.

Soils

Provisions for revegetating and stabilizing temporary roads, landings, borrow pits, skid trails and other human-caused soil disturbance will be planned through the IDT process and incorporated into project plans. Cut and fill slopes that require stabilization will be stabilized by the most appropriate means as determined through the IDT process. Stabilization may include revegetation or retaining structures or a combination of both methods. Where revegetation measures are required, seeding or planting will take place the first growing season following disturbance. Temporary roads, landings and skid trails will be rehabilitated when they are no longer used. Borrow and rock pits no longer needed will be drained, unless developed for fish or waterfowl, and mineral soil revegetated using the most appropriate means. Areas already disturbed or not covered by contract will be rehabilitated on a priority basis by the Forest Service as watershed rehabilitation money becomes available. The highest priority when scheduling rehabilitation projects will be given to highly erodable terrain directly affecting fish and water resources.

Logging or roading will not be done on slopes greater than 75 percent unless approved in advance by the Forest Supervisor following interdisciplinary team

(IDT) planning. Developmental activities on slopes between 35 and 75 percent will receive prescriptions by the IDT to reduce the possibility of soil failure. Developmental activities will not be approved on terrain where IDT evaluation indicates a high likelihood of mass failure and where mitigating measures are not practical.

Crossings of V-notched drainages will be designed to prevent debris jamming, unless IDT evaluation indicates that a culvert is acceptable. Crossing locations and bridge designs will be determined through the IDT process.

Rock quarries and borrow pits will be planned through the IDT process. Blasting will be avoided on potentially landslide-prone areas during or within 72 hours following heavy rainstorms, as determined by a hydrologist. Where other sources are available, borrow pits will not be located on such areas. Where no other alternative exists, quarries will be stripped of their overburden and the excavated material hauled to a stable location, seeded with grass and fertilized. The IDT's engineering representative will locate the pit and waste areas after advice from appropriate specialists.

Development activities on organic soils and mineral soils classified as wetlands will be conducted in compliance with existing executive orders.

Water

The policies below will be followed unless an IDT investigation indicates acceptable management alternatives exist, in which case site-specific prescriptions will be applied to assure watershed protection:

a. Roads will not be built across alluvial floodplains or mass wasting areas.
b. Roads will only be built across streams in stable reaches.
c. Roads and borrow pits will be located away from water courses. Whenever locations near stream courses are recommended, provisions must be made for drainage from roads or materials sites to run off through a vegetative screen or sediment basin prior to entering a water body.
d. Channel changes will require approval by the Forest Supervisor after consultation with the Alaska Department of Fish and Game.

Floodplains will be managed to avoid adverse impacts associated with occupancy and modification, and in compliance with executive orders.

Where the opportunity exists, and in cooperation with the Alaska Department of Fish and Game, borrow pits will be designed and excavated to facilitate their conversion to salmon rearing ponds.

Fish

Location of roads within a Fish Habitat Management Unit (FHMU) parallel to fish streams and crossing fish streams will be permitted only where other locations are not feasible and the management goal for fish habitat can be met. Where roads are located near fish streams, introduction of sediment must be avoided; sidecasting and waste materials must not encroach upon the streamcourse; and as much undisturbed ground cover as possible shall be left between the road and the stream. Complete endhaul of waste material will be required where roads are located near fish streams when there is the probability of downhill movement of this material into the stream below. Fill will be placed into fish streams only when considered through the IDT process to be the best alternative. Fish passage must be assured at all locations where roads cross fish streams. Prescriptions will specify permissible uses of heavy machinery and the timing of road construction activities.

The use of gravel as a source of borrow shall not be allowed in areas where pink and chum salmon spawn.

Blasting that adversely affects fish spawning beds will be limited to times when eggs and alevins are not vulnerable. Safe times and distances will be determined on a site-by-site basis in conjunction with Alaska Department of Fish and Game, National Marine Fisheries Service, and U.S. Fish and Wildlife Service.

Streamcourses may not be changed or diverted without written approval from the Forest Supervisor, who shall issue such approval after consultation with Alaska Department of Fish and Game, National Marine Fisheries Service and U.S. Fish and Wildlife Service, and where it is clear that habitat impairment will not result.

Estuaries and Tidal Meadows

Unavoidable activities that may have a disturbing or disrupting influence on fish and wildlife species or habitat during critical life history periods (e.g., nesting and feeding) will be scheduled for time periods when such influences will be minimal or nonexistent. Such times will be determined prior to the proposed activity in cooperation with the Alaska Department of Fish and Game and other agencies.

Forest development activities within or adjacent to estuaries and wetlands will be avoided unless determined by the IDT process to be consistent with management goals. Permanent road systems may, through the planning process, incorporate provisions for user and scenic turnouts. Where roads or other facilities are approved for location near estuaries, fills, sidecasting and waste materials must not encroach upon such areas unless recommended during the IDT process. As much undisturbed ground and cover as possible must be left between the activity or facility and the estuary or wetland to reduce or eliminate disturbance of fish, wildlife, or recreational values. The use of intertidal areas as a source of borrow will be limited to those areas and methods stipulated through the IDT process as being compatible with the character of the area, and where the borrow source can be returned to a natural appearance subsequent to use.

Roads, buildings and all other facilities and operations not requiring direct water access will normally be located behind a zone of windfirm timber. However, the IDT may recommend otherwise if the character of the area would not be significantly impaired.

Log Transfer Facilities

The following are intended as selection criteria to assist the IDT process in the choice of locations for log transfer and storage sites in estuaries areas. The number of active log transfer sites and storage areas in any given bay or bay complex will be minimized by selecting locations that will accommodate future logging without requiring additional transfer or storage sites.

The steepest submerged lands having the least productive intertidal and subtidal zones will be considered first during site selection. Slopes of 40 percent or more are desirable.

Log transfer sites along straits, channels, and the shores of deep bays where currents may aid in dispersing debris will be considered first during site selection.

Rafting and log storage areas will be in the deepest water possible with a minimum depth of 13 meters (40 feet) at mean lower low water. Further, logs or

rafts must not be allowed to ground at any tide stage if there is a possibility of damage to bottom organisms. Timber purchasers should be encouraged to transport stored logs to their final destination as quickly as possible, to reduce impacts associated with long-term storage in estuaries waters.

Sites in deep bays, rather than in shallow bays, should be considered first; bays without sills or other natural restrictions to tidal exchange should be selected. Log transfer sites should be located near the mouths of bays rather than at the heads of bays unless the environment at the mouth of the bay is of special significance.

With respect to any permit application to the Corps of Engineers for a log rafting or storage or transfer site, the Forest Service will provide its expertise on specific or alternative sites.

The use of existing log storage and transfer sites not complying with the policies outlined in the Guide will be phased out. Termination of site use will coincide with current contract expiration or, in the case of long-term sales, at the beginning of the next subsequent five-year rate redetermination period. Alternative sites will be provided in accordance with the Guide.

Where a nonconforming site and/or facility is considered for use during a subsequent contract or five-year operation period, an IDT study will be made to determine whether adverse impacts of relocating the nonconforming site exceed those resulting from continued use of the existing site. If the adverse impact of relocating a needed facility is judged to exceed that occurring at its present location, the facility will be allowed to remain in use unless the study indicates that management goals will not be met. In such cases, no further use of the facility will be allowed and an alternative site will be provided in accordance with Guide procedures.

Transportation

Prescriptive plans will provide for special study of specific options, and will indicate where transportation facilities are likely to be located. These locations may be modified by further IDT input and economic and environmental analysis. The Forest Plan will attempt to specify areas such as proposed road corridors, applicable yarding methods, and the type of water transport to be used where logging is contemplated.

Project plans will include the final determination of transportation modes and related facilities and their specific locations.

An economic and environmental analysis will be used to determine facility standards at the prescription level and these standards will be met during the implementation phase. Forest prescriptive plans and project plans will not preclude future transportation development appropriate to the particular land-use designation.

Transportation modes and their related facilities will be located, designed and constructed to minimize change to the environment and resources and will be in compliance with policies as established in the resource accounts.

The Forest Service will employ a wide range of choices in methods for managing roads. The following goals will be considered:

a. A range of recreational experiences will be provided from pedestrian-only to full-use motorized vehicles.

b. The need for dispersal of people to accommodate fishing and hunting and nonconsumptive use of wildlife.

c. The long-term land management objectives of the accessible land area.

The Forest Service endorses cooperative use of the forest development road system for hauling of commercial products, recognizing that user conflicts will occur in some situations. The commercial user hauling from other than National Forest lands is expected to assume a share of the original construction and maintenance costs of the roads used. The costs will be proportioned on the basis of the use of the hauler and the total use of the road.

Conservation of petroleum energy supplies will be considered in the location, design, construction, and operation of the transportation system.

Roads that are not part of the permanent transportation system will have vegetation established within 10 years following termination of the timber sale contract or other permit or lease under which they were built.

Roads will be constructed in the most cost-efficient manner, considering other resource values. The Forest Highway Program and joint financing of construction will be used as methods to construct facilities to a higher standard where appropriate.

Transportation and Utility Corridors

Transportation and utility corridor planning and development will be in compliance with the policies and criteria established in this and other resource elements. Transportation facilities constructed by the Forest Service will meet standards required for the use, management and protection of the National Forest System, considering safety, costs of transportation (including operation and maintenance), and impacts on other resources.

Transportation and utility corridor planning and development will be coordinated with the Canadian, Federal, State, and local government agencies as well as private land owners. Transportation connections by the Forest Service will not be made between communities or emerging communities without the participation and collaboration of State and local governments, communities, and affected individuals.

The State of Alaska has identified several natural transportation corridors in Southeast and Southcentral Alaska for possible land transportation facilities. The primary function of these corridors is for the transportation of people, goods, and services between communities. Consideration of the allocation of lands along these corridors for transportation and utility purposes is required in Forest planning. Allocated transportation corridors will be included in Forest Highways as appropriate.

Transportation planning will be integrated with present and future land management plans to the extent feasible. Forest Plans will show existing and anticipated forest arterial and major collector corridors. Plans will identify as far as possible, what modes of transportation will be developed for a given area. Water transportation modes and anticipated terminal transportation facilities will be specified where logging activities, ferry terminals, public access, barge ramps, and similar facilities are intended. The likely corridor locations for other transportation facilities will be subsequently developed.

Approved transportation and utility corridor proposals and plans will be integrated with Forest Plans at all planning levels to utilize each corridor to the greatest extent possible. Corridors for future utilities usage will follow existing and future land transportation routes to the extent practicable and appropriate. Electrical transmission facilities constructed and maintained without road access need not follow road corridors.

Alaska Timber Task Force "Log Transfer Facility Siting, Construction, Operation, and Monitoring/Reporting Guidelines" include 10 siting, 9 construction, and 7 monitoring and reporting guidelines. These are:

LTF Siting

S1. Proximity to Rearing and Spawning Areas: Siting of log transfer and log raft storage facilities within 300 feet of the mouths of anadromous fish streams, or in areas known to be important for fish spawning or rearing, is normally prohibited.

S2. Protected Locations: Log transfer and log raft storage facilities should be sited in weather protected waters with bottoms suitable for anchoring and with at least 20 acres for temporary log storage and log booming.

S3. Upland Facility Requirements: Log transfer facilities generally should be sited in proximity to at least five acres of relatively flat uplands. There should also be a body of water sufficient to provide a minimum of 60 lineal foot facility face.

S4. Safe Access to a Facility from the Uplands: To provide safe access to the log transfer facility and adjoining log sort yard, the facility should be sited where access roads to the facility can maintain a grade of 10 percent or less for trucks and 4 percent for specialized equipment.

S5. Bark Dispersal: Log transfer facilities should be sited along or adjacent to straits and channels or deep bays where currents may be strong enough to disperse sunken or floating wood debris. Siting log transfer facilities in embayments with sills or other natural restrictions to tidal exchange should be avoided.

S6. Site Productivity: Sites for in-water storage and/or transfer of logs should be located in areas having the least productive intertidal and subtidal zones.

S7. Sensitive Habitats: Log transfer facilities and log raft storage areas should not be sited on or adjacent to (i.e., near enough to effect) extensive tideflats, salt marshes, kelp or eelgrass beds, seaweed harvest areas or shellfish concentration areas.

S8. Safe Marine Access to Facilities: Log rafting and storage facilities should be safely accessible to tug boats with log rafts at most tides and on most winter days.

S9. Storage and Rafting: Logs, log bundles or log rafts should be stored in areas where they will not ground at low tide. A minimum depth of 40 feet or deeper measured at Mean Lower Low Water (MLLW) for log raft storage is preferred.

S10. Avoid Bald Eagle Nest Trees: Site log transfer facilities to avoid bald eagle nests. No project construction or operations should be closer than 330 feet to any bald eagle nest tree.

LTF Construction

C1. Log Transfer Facility Design: Log transfer facility design should be the least environmentally damaging, most practicable alternative. Factors to be considered in selection of design alternatives include: 1) economic practicality; 2) facility requirements; 3) physical site constraints; 4) timber volumes to be transferred (site usage and duration); 5) total potential effects on biota and water quality, (including biological productivity and sensitivity); and 6) other potential uses of the site and facility.

C2. Fill Structures: Fill structures shall be designed and constructed to prevent erosion, pollution, and structural displacement.

C3. Timing of Inwater Construction: Inwater construction, blasting and/or filling associated with LTF sites should be timed to limit adverse impacts to marine and estuarine fishery resources and avoid conflicts with other user groups.

C4. Bark Accumulation Management: The siting, design, and operation of the LTF and contiguous collateral upland facilities shall utilize best practicable procedures and methodologies to control intertidal and submarine accumulations of bark.

C5. Solid Waste Management: Solid waste, including wood and other solid waste generated from the LTF, contiguous and other collateral facilities, shall be routinely removed from the log transfer facilities and adjacent facilities and disposed of at an approved upland solid waste disposal site.

C6. Surface Drainage Management: The design, construction, and operation of LTF's, contiguous sort yards and/or log storage yards shall utilize practicable procedures for control of surface water runoff from facilities.

C7. Control of Hydrocarbons: The log transfer system and adjacent sort yard handling equipment shall be operated and maintained to minimize petroleum and lubrication products from entering waters.

C8. Onshore Log Storage: Where feasible, preference must be given to onshore storage and barging of logs.

C9. Facility Maintenance and Reclamation: The permittee shall maintain the structure or work authorized in good condition and in reasonable accordance with the approved plans and drawings. If and when the permittee desires to abandon the authorized activity herein, unless such abandonment is part of a transfer procedure by which the permittee is transferring his interests herein to a third party, the permittee must restore the area to a satisfactory condition.

LTF Monitoring and Reporting

M1. Monitoring Requirements: Monitoring should be undertaken at all continuous and intermittent use LTF sites, and at those occasional and incidental use LTF's at which total volume of logs transferred is similar to that of intermittent use sites. The level of monitoring should be determined on a site-specific basis. Monitoring at occasional and incidental use facilities may be required on a site-specific basis. Requirements for monitoring should be responsive to data obtained during prior monitoring activities.

M2. Annual Monitoring: At continuous and intermittent use LTF's, monitoring of bark debris accumulation should occur prior to the operating season as a minimum requirement. Monitoring at intermittent LTF's would occur only during those periods when the LTF is active.

M3. Elements of Monitoring Program: Elements that should be included in a monitoring program for continuous and intermittent use LTF's are site-specific and may include but not be limited to: a) permanent transects; b) measurements of areal extent, thickness and percent coverage of bark debris; and c) parameters measurements from Mean High Water to depths of 60 feet Mean Lowest Low Water.

M4. Monitoring Plan Approval: Permittees will be required to submit a monitoring program to the permitting agencies prior to operation of a new continuous or intermittent use LTF. Monitoring of occasional or incidental use sites will be limited. Agency approval of monitoring plans is required.

M5. Monitoring for Oil Sheen: Waters in the vicinity of an LTF shall be monitored during operations for the presence of a visible sheen and recorded, when observed.

M6. Monitoring Upland Discharges: On a case-by-case basis, discharges of rainfall runoff from the log sorting and storage yard and discharges from any settling pond used to treat water may require monitoring to ensure compliance with State Water Quality Standards and the Clean Water Act.

M7. Reporting Guidelines: Routine annual reports include the following descriptive information: a) location of the LTF (402/404 permits require latitude and longitude; Forest Service traditionally uses legal descriptions); b) description of LTF, including transfer devices, and sorting and storage areas; c) permit holder and/or operator of LTF; d) starting and ending dates of operating season (from first to last bundle), and number of operating days per season; e) gross volume in board feet (Scribner Scale) or number of bundles transferred during the operating season; and f) monitoring data described in Monitoring Guidelines.

RESULTS OF TLMP IMPLEMENTATION

The results of implementing the Forest Plan will be displayed by comparing actual with anticipated outputs. Predictions were made for miles and cost of road construction each year.

Methods of funding road construction were also discussed in the Forest Plan and further quantified in the 1985 "Status of the Tongass" report. To understand the output reports, one must first be introduced to these different methods of funding roads and the reasons for using each.

The standard method of funding roads to access timber sales is for the government to pay the timber purchaser trees, not money, in return for the construction of a road. The cost of the road (up to a specified limit) is credited to the amount owed to the government for the timber. This is known as "purchaser credit". Under this method the timber purchaser performs all needed road construction. A second method is for the Forest Service to construct all or part of the roads required for the timber sale before selling it. This has been called "pre-roading", and requires public investment above the minimum necessary to prepare a timber sale. When the timber value is high enough to cover the cost of the roads the first method, purchaser credit, can be used. When this is not the case, public investment in the roads may be necessary.

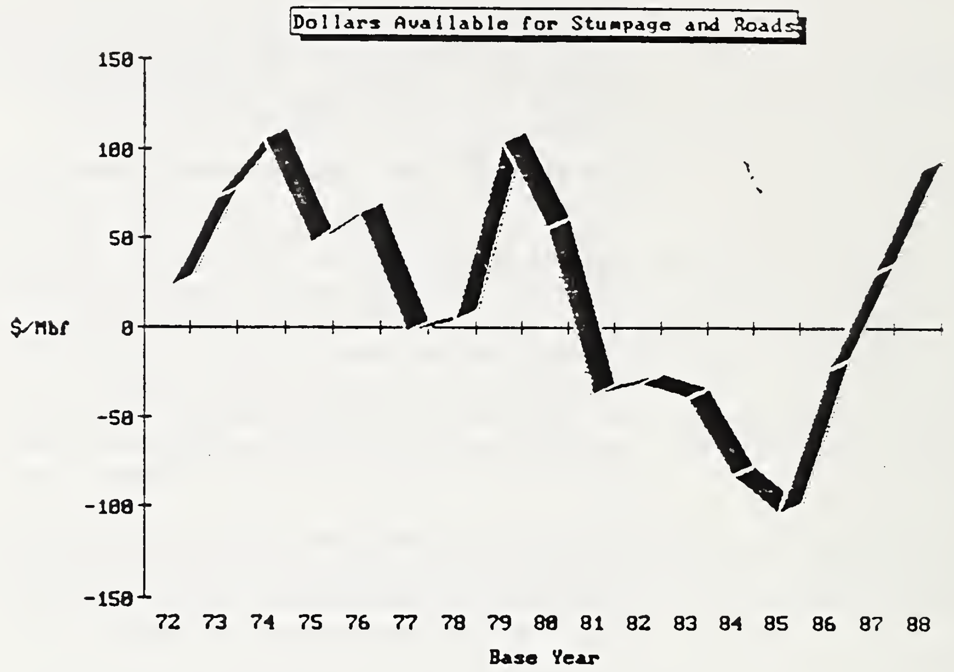
The Forest Plan recognized that "to obtain the proposed harvest of 450 MMBF[a] under the proposed action, additional investment would be required to build access roads prior to timber sales...". This was due to two factors: timber market conditions and land allocation decisions.

The effect of market conditions was described as follows:

> "When logging and manufacturing costs and profit and risk allowances are subtracted from end-product selling values, the remaining value of the timber is available to the purchaser for road construction and stumpage. In some years, when markets are good, the remaining value is high and public investment may be at lower level. However, in periods of poor markets--when the available residual values are insufficient to cover the full cost of road construction--government investments can be substituted to facilitate construction of the roads."

To display the need for added investments, an index of values per thousand board feet available to the purchaser for road construction and stumpage was obtained by analyzing a typical timber sale. This "index sale" was reappraised each year from 1972 to 1977 to reflect change in market and construction costs. The results of this analysis were displayed illustrating how major fluctuations in the timber market produced wide variations in purchaser dollars available for roads and stumpage during the five year period preceeding the Forest Plan. The same "index sale" has been reappraised each year thereafter and an updated version of the original display is presented in Figure 3-50. In 1977 it was estimated that the average system road cost was about $68 per thousand board feet. It was pointed out that since values remaining to pay for roads were only about $20 per thousand board feet during the first half of 1977 a high government investment was required.

FIGURE 3-50
DOLLARS AVAILABLE FOR STUMPAGE AND ROADS



Source: R10 Index Appraisal

As was mentioned previously not only market changes, but also allocation decisions were considered reasons for the government to provide investments in roading. This was described as follows:

> "There are areas on the Tongass where constraints involved with the management of other forest resources reduce the timber available for harvest to the point where the roads cannot be built with timber receipts. In other parts of the Tongass, the timber is too marginal--either in quantity or quality--to amortize the roads by itself."

The decision to manage almost half of the operable commercial forest land for non-timber uses necessarily directed the timber program to plan harvest in these marginal areas in order to sustain the annual harvest goal. In other words, given the allocation decisions made, only by including areas where road costs often exceed timber values could the forest sustain a harvest of 450 MMbf per year. Additional public investments were relied on to compensate for this.

Over the past decade did these investments turn out to be necessary to meet the goals outlined in the Forest Plan? As can be seen in Figure 3X, market changes alone created need for added investment through much of the life of the Forest Plan. From a high of over $100 per thousand board feet in 1979, market conditions dropped the residual values to about -$100 per thousand board feet in 1985. It must be noted here that this figure does not mean that anyone

harvesting timber in 1985 lost $100 per thousand board feet. These are appraisal figures, based on the costs of an operator of average efficiency. Some purchasers are more efficient, and for them, logging costs less than the appraisal allows. Also these figures include full profit and risk allowances. Some operators are willing to build roads through reduction of their profit. What the figures do show is that if there was a chance that added investments in road construction were necessary in 1977 to make the scheduled harvest available, they were certainly necessary in the years 1981 through 1986.

In fact, one problem that arose during the period of poor market conditions was that even after Forest Service construction of the roads, a timber sale may fail to sell. The investment in the road would then be unproductive until the timber eventually sold. To prevent this the Forest Service has implemented a policy where roads will generally be constructed only after a sale has actually sold. This policy ensures that roads, once constructed, will be used in the near future. Under this policy, however purchasers are not able to harvest timber as quickly as they would if the roads were in place at the time of the timber sale.

Along with this policy, funding by the Government of a portion of the cost of a purchaser constructed road, called augmentation, is now being used in addition to the established pre-roading program. Augmentation has the advantage of funding only roads that the timber industry currently needs while providing a better cash flow situation for the timber operator. Purchaser construction is also generally less expensive than Forest Service construction (currently purchaser constuction is about 60 percent of public works costs). This is due to such factors as duplication of mobilization expenses (when both the road constractor and timber purchaser move equipment to and from a site) and Government contracting regulations requiring application of the Davis-Bacon Act wage rates for Government contracts.

Expectations and Accomplishments

The Forest Plan makes estimates of anticipated road construction mileage in two separate sections: Effects on Timber, and Effects on Soils. The timber section estimates that "an average of 115 miles of permanent road (will be) added to the forest transportation system annually". This was derived from the estimate in Appendix H that the average Tongass timber roading is 4.5 miles per section of operable commercial forest land. The number of sections scheduled for harvest annually was multiplied by this factor to get the average annual road construction mileage over the length of the rotation. This does not recognize the fact that harvest unit dispersion causes more road to be built per year early in the timber rotation. The calculations for timber-related investment needs in the Forest Plan partially took this into account for the LUD III areas by assuming that harvest units would be more dispersed in these areas than in LUD IV areas. The assumption was made that "the initial entry (into LUD III areas) will need 160 percent of the normal roading to harvest the same amount of timber as in the normal initial entry".

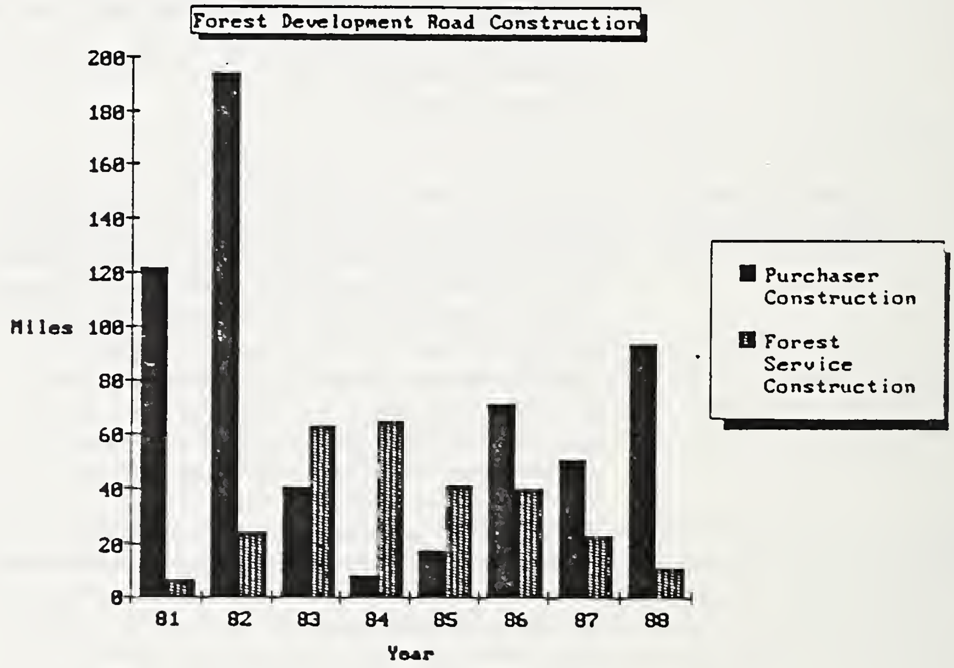
In the "Status of the Tongass National Forest, 1985 Report", these timber-related investment-needs assumptions were analyzed to more specifically present the Forest Plan roading assumptions. The results of this analysis showed that the Forest Plan anticipated that the average annual mileage of Forest Service construction (pre-roading) would be 46 miles. The actual average for the years 1981-88 has been 34.6 miles. Forest Service reconstruction has averaged 13.3 miles per year. Purchaser construction was anticipated to be 152 miles per year. The actual average for the years 1981-88 has been 75.2 miles. Purchaser

reconstruction has averaged 21.7 miles per year. The shortfall is due mainly to the depressed timber market over much of this period which caused the average annual volume of timber sold to be less than expected.

The estimate of "295 miles per year of new roads" in the Effects on Soils section includes the mileage of temporary roads needed for timber sale activities. These roads are not intended to be a part of the forest development transportation system and are not necessary for future resource management. After use, drainage structures are removed, prescribed erosion control and stabilization measures are carried out in accordance with the project plan, and the roadbed is allowed to re-establish vegetative cover in accordance with the National Forest Management Act. Because these temporary roads are included in the estimate of 295 miles per year, that estimate is necessarily higher than the annual construction estimate for permanent forest development road.

Figure 3-51 displays annual construction actually accomplished (new construction only) for the years 1981-88. Note the strong relationship between timber market level (strong in 1980-81, depressed from 1982-86, gaining strength from 1987-88) and amount of construction and method of funding.

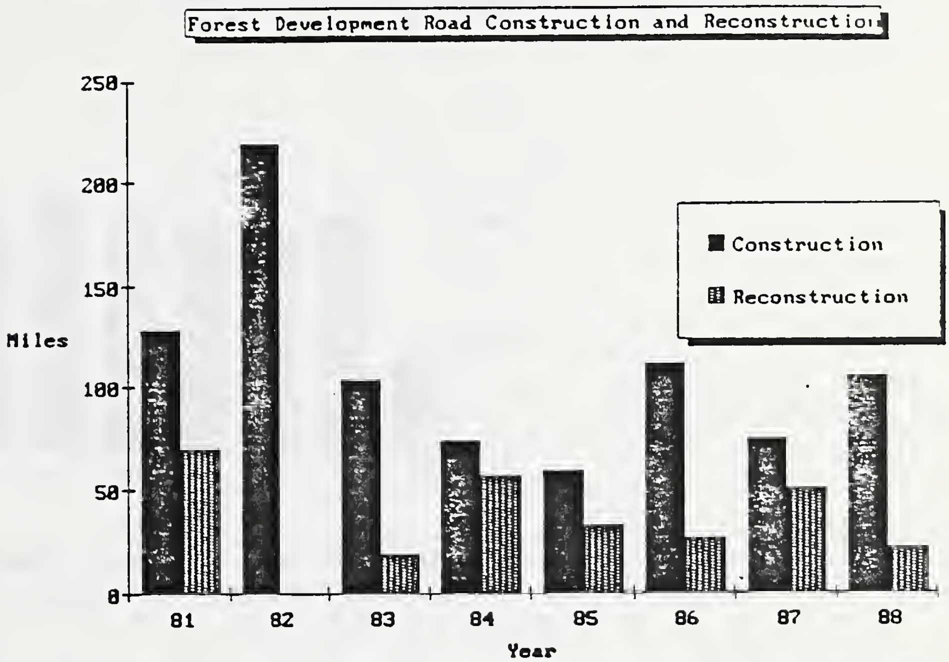
FIGURE 3-51
ANNUAL CONSTRUCTION ACCOMPLISHMENTS FOR 1981-1988



Source: ANILCA Timber Supply and Demand, Draft - 1988 Report

Figure 3-52 displays total road construction and reconstruction (includes both purchaser and Forest Service construction) for the years 1981-88.

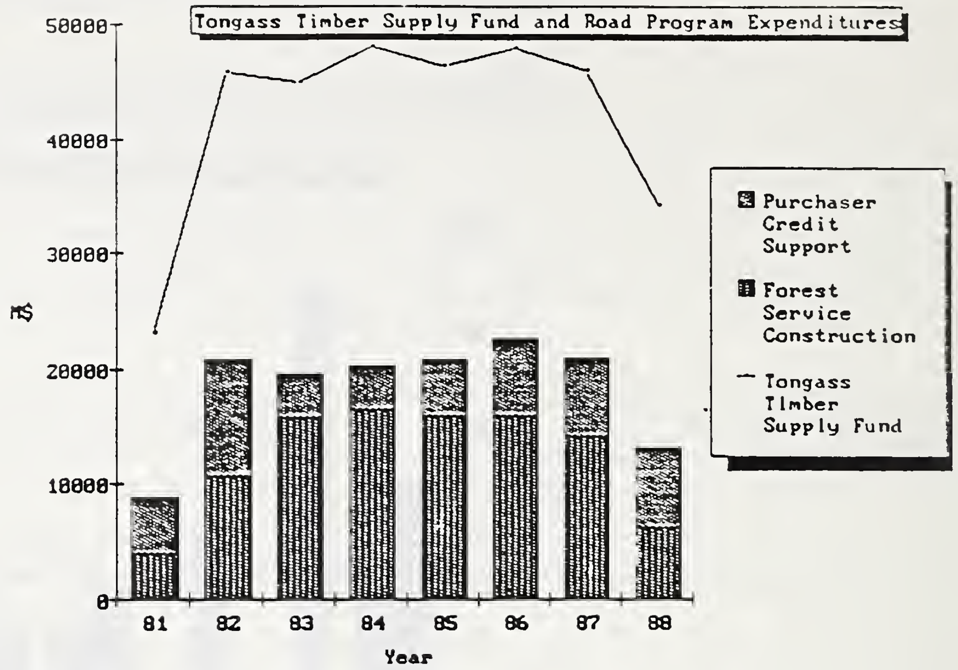
FIGURE 3-52
ROAD CONSTRUCTION AND RECONSTRUCTION FOR 1981-1988



Source: ANILCA Timber Supply and Demand, Draft - 1988 Report

The average annual cost for Forest Service road construction, including survey, design, and contract administration anticipated in the Forest Plan was $18.8 million in 1985 dollars (Status of the Tongass National Forest, 1985 Report). The actual average annual cost for the years 1981-88 has been $12.4 million. Included in this figure is an average of $0.7 million per year which has been spent on log transfer facilities, as well as $0.6 million per year of bridge replacement costs. During the years 1981-88, 122 log-stringer bridges were replaced with permanent bridges or culverts. Figure 3-53 displays the annual expenditures for both Forest Service construction and purchaser credit support. The top line of Figure 3-53 is the total Tongass Timber Supply Fund. The bars underneath show the portion of the fund that was expended on the road program.

FIGURE 3-53
TONGASS TIMBER SUPPLY FUND AND ROAD PROGRAM EXPENDITURES



Source: ANILCA Timber Supply and Demand, Draft - 1988 Report
Note: Included are administration and support, preconstuction and construction engineering, and augmentation.

OPPORTUNITIES AND CONCERNS

TSPIRS

The introduction in 1987 of the Timber Sale Program Information Reporting System (TSPIRS) has provided the yearly opportunity to display a comprehensive picture of the financial, economic, and socio-economic aspects of managing the Tongass timber program. This system provides a single year "snap-shot" within the integrated long-term resource management program proposed in the Forest Plan. In particular, the often ignored long term value of roads and bridges is being displayed.

The Forest Service was assisted by the General Accounting Office (GAO)--the accounting and auditing arm of Congress--in development of the methodology used to prepare the "Statement of Revenues and Expenses" portion of the TSPIRS report. Under generally accepted accounting principles, assets such as roads and bridges are recognized as having a useful life of many years. The costs associated with these construction activities are investments that benefit future as well as current harvest and other resource management activities. To account for this, TSPIRS amortizes these costs, or spreads them out over a period of years, using the ratio of the current year's volume harvested to total volume to be harvested over the rotation. This amortization period is generally 80-110 years. As timber is harvested, assets gradually deteriorate in spite of regular maintenance. However, when road reconstruction is necessary, it is generally much less costly than building a brand new road in the same area. By showing both construction and reconstruction costs in the growth activity pool, this residual value is recognized.

Road Costs

A continuing concern over the past decade has been road costs. The depressed market conditions from 1982-86 emphasized the need to reduce or control the costs associated with timber harvest in order to maintain a viable timber industry in Alaska.

The Forest Service and the Alaska Loggers Association have combined efforts through a cost savings committee to reduce road construction costs. This committee concentrated primarily on developing the minimum standards necessary for local timber haul roads. Tthrough work of this committee, costs were reduced by:

1. Deleting requirements for surface finishing by motor grader.
2. Reducing costs by reducing requirements for machine backslope finishing to be compatible with subgrade shovel excavation.
3. Reducing construction tolerance controls to within limits required by safety, environmental concerns, and critical vehicle use. This includes a reduction of roadway drilling, pioneering costs, and volumes of embankment.
4. Reducing costs of engineering to be commensurate with the end product.

These reduced standards were put into effect on some roads in 1983 and made applicable for all local roads in May 1984. It is estimated that the reduced standards resulted in a cost savings of about 10 percent.

VISUAL RESOURCE

OVERVIEW

Southeast Alaska is a unique combination of land and marine environments comprised of a thirty to forty-mile-wide mainland strip and over a thousand offshore islands. Together these equal nearly 13,000 miles of meandering shoreline interspersed with numerous bays. A system of waterways separate these islands, forming what is known as the Inside Passage; a popular and vital marine route for traveling and viewing Southeast Alaska.

The visual resource of the Tongass is most often viewed from the many communities in Southeast Alaska, from the many miles of the State ferry route, known as the Alaska Marine Highway, from cruiseship routes, and from popular small boat routes, including numerous bays and boat anchorages. An increasing number of landscapes are being viewed from small aircraft such as floatplanes and helicopters.

The landscapes of the Tongass are seen from a variety of viewing distances. Topography is relatively steep and vegetatively homogenous along many of the waterways, making large scale development activities easily visible in foreground or middleground positions (up to 5 miles away). Little or no visual impact may occur when slopes are less steep. The two primary visual impacts on the Tongass are timber harvest areas and hydroelectric powerline clearings. When looking at the Tongass as a whole, these impacts are concentrated and are not dominant when viewed from saltwater.

Development activities on National Forest lands are concentrated mostly around the communities of Petersburg, Wrangell, Ketchikan, Hoonah, and Sitka. The following islands and their associated landscapes have been affected by past timber harvest: north Prince of Wales, east Chichagof, north Kupreanof, north Kuiu, Zarembo, Wrangell, Mitkof, and portions of Revillagigedo.

Activities tend to be concentrated within the first 1,000 feet in elevation above sea level, and are within close proximity to marine access or in valley bottoms where road access and related development activities are feasible. With the expanded road network, the opportunity for viewing the forest has also increased. Areas which were once limited to marine oriented viewing only may now provide land based opportunities.

Visual quality across the Tongass varies by location and is dependent on a variety of factors. In addition to the variety of natural aspects of the visual resource (geology, vegetation, waterforms, etc.), man-made factors that can be seen influence visual quality of some areas. These include roads, rock quarry sites, timber harvest, log transfer facilities, hydroelectric powerline clearings, recreation facilities, fish projects, mariculture operations, and mining developments. To date, the effects of many of these activities on the visual resource, as seen from heavily used public areas, have been reduced, eliminated or mitigated by landscape management practices and design guidelines.

For some viewers of the Tongass Forest landscape, development may offer interest and variety. For example, old canneries, lighthouses, homesteads, remnants of fox farms or gold mining operations as well as today's existing timber harvest operations, recreation cabins, active sportfishing and commercial fishing activities, boat docks and floats contribute to interest and variety in a prevailing natural-appearing landscape.

Management of lands adjacent to the National Forest (State and private lands) has also affected the visual setting of Southeast Alaska. Timber harvest activities on Native Corporation lands, State land selections and associated development, are changing the appearance of parts of Southeast Alaska.

VISUAL CHARACTER TYPES

The Tongass National Forest is made up of six distinct landscape character types (Visual Character Types, 1979). Each type has unique visual characteristics of landform, rock formations, waterforms and vegetative patterns. These types are discussed in the following paragraphs and are displayed in Figure 3-54.

The northern end of the Forest is represented by the **Admiralty/Chichagof** visual character type. Landforms are generally rounded, with exceptions where mountainous terrain is rugged and snow covered most of the year. Rocky islands, reefs and rock bluffs are found frequently on the outer coast of Chichagof Island, the Mitchell Bay and Kootznahoo area and along the southern tip of Admiralty Island. Saltwater bays and estuaries are numerous.

Much of this character type exists in a natural-appearing condition. Small communities such as Hoonah, Tenakee Springs, Pelican, Elfin Cove and Angoon are located within this character type. Timber harvest activities are presently occurring on Chichagof Island from Icy Strait to Peril Strait on both private and National Forest lands. Mining operations are occurring on public lands on Admiralty Island.

The **Kupreanof Lowland** visual character type encompasses the central portion of the Inside Passage. The area is made up of islands with rolling terrain and topographical relief varying from 300 to 1,500 feet, and is separated by an intricate network of waterways. Mountains are scattered and block-like, rising to 3,500 feet above the lowlands. The shoreline is made up of many small bays, rock reefs, and occasional small gravel beaches. The spruce/hemlock forest dominates this character type, with exceptions in areas of higher elevations where alpine ecosystems dominate.

The communities of Kake, Rowan Bay, Port Protection, Point Baker as well as the Tebenkof Bay and Petersburg-Duncan Salt Chuck Wildernesses are within this character type. The southern portions of Kuiu and Kupreanof Islands, Rocky Pass, and south Lindenburg Peninsula are in a natural condition. The northern portions of Prince of Wales and Kuiu Islands are heavily modified due to timber harvest and road development activities.

The **Baranof Highland** character type reflects the unique qualities of Baranof Island, with elevations reaching 3,000 to 5,000 feet. Shoreline forms are very rugged with steep sided fiord country on both east and west coasts.

The majority of this character type remains in a natural appearing condition. The communities of Sitka, Baranof Warm Springs and Port Alexander are located on Baranof Island. Timber harvest activities have occurred on the northern reaches of Baranof Island from Sitka Sound to Peril Strait as well as Kruzof Island.

The **Cordova-Yakutat** visual character type includes the furthest north portions of the Forest. Running east to west, the area spans from Yakutat to the Malaspina Glacier to Icy Bay to Cordova. The Chugach Mountains to the north and the Wrangell-St. Elias Mountain Ranges to the south act as visual backdrops to this character type and includes the second tallest peak in North America. The Yakutat Forelands dominate scenes adjacent to Yakutat and Russell Fiords and

FIGURE 3-54
VISUAL CHARACTER TYPES OF THE TONGASS NATIONAL FOREST

Visual Character Types are mapped below. The physiographic features of the land were used as an initial basis for determining visual character types based upon Physiographic division of Alaska (Wahrafteg, USGS) and Landscapes of Alaska (USGS). The character types provide a frame of reference for classifying the scenic quality of the land's physical features.

Source: VISUAL CHARACTER TYPES
USDA Forest Service Series No R10-63 May 1979

include the community of Yakutat, which is located on glacial outwash and has little topographic relief.

Past logging activities are evident near Yakutat. Small fish camps are visible along the rivers and beaches. These large expanses of sand beaches stretching for miles make this a unique area on the Tongass. The Russell Fiord Wilderness is in this character type.

The southern reaches of the forest are represented by the **Coastal Hill** visual character type, whose islands offer an extensive landform variety with elevations ranging from 1,000 to 4,500 feet. Areas with elevations less than 3,500 feet were glaciated and have rounded hummocky summits, knobs and ridges.

The communities of Wrangell and Petersburg are within this character type. The area is substantially developed, with timber harvest activities evident on central Prince of Wales Island, north and central Revilla Island, Mitkof, Wrangell, Deer and north Etolin Islands. Ferry line and cruiseship traffic pass through this area.

The **Coast Range** visual character type encompasses the mainland from Dixon Entrance to the south and Lynn Canal to the north. The scale of the landforms are large and massive, generally ranging from 5,000 to 7,000 feet in elevation; including rounded summits, with occasional rock formations reaching to 9,000 feet. Geologic features abound in this character type--cliffs, rock escarpments with jagged peaks, and spires at higher elevations. Glacial streams are generally braided, and originate in British Columbia.

This character type offers numerous opportunities to view spectacular scenery, and includes the Stikine LeConte, Endicott River, and Tracy Arm-Fords Terror Wilderness Areas; Misty Fiords National Monument; and the communities of Juneau, Skagway, and Haines. The majority of this character type is natural appearing, however, there is evidence of past and current mining and timber harvest on both private and public lands. Commercial sight-seeing ventures are promoting the scenic attractions found in this area.

SUPPLY/INVENTORY

The Tongass Land Management Plan provides numerous opportunities for viewing natural scenery through the allocation of LUD 1 (Wilderness Areas) and LUD 2 areas (where roading is allowed, and timber harvest is not). In areas designated LUD 3, an extended rotation of 200 years is provided for regenerating timber stands in areas of high visual sensitivity (TLMP constraint codes 11-17) and 15 percent retention in areas of medium visual sensitivity (TLMP constraint codes 21-27). LUD 4 recognizes areas of high visual sensitivity with a 120-year rotation, and areas of medium visual sensitivity with 5 percent retention. Areas of extended rotation were intended to increase the time frame for harvesting on a particular landform. The normal rotation period is 80 to 100 years. (Source: TLMP Evaluation Report, Appendix A, November 1984)

The TLMP Environmental Impact Statement, Part 2 provides broad direction to each management area and, in some cases, describes appropriate Visual Quality Objectives (VQO's) for specific areas within each management area. The Tongass Land Management Plan was finalized prior to completion of the Visual Quality Objectives inventory. So, although VQO's were part of the TLMP direction, they were not based on any formal inventory implemented according to Regional and National guidelines.

Table 3-147 compares Tongass-wide land use designations to areas of high and medium visual sensitivity. In the development of TLMP, areas of high visual sensitivity were assumed to be those lands seen in the foreground distance (from viewer to one-quarter mile from the viewer). Areas of medium visual sensitivity correspond to those in the middleground distance (from one quarter mile to 3 - 5 miles from the viewer). The remaining areas were either not seen or were seen in the background distance.

TABLE 3-147
FOREST-WIDE LAND USE DESIGNATIONS OF VISUALLY SENSITIVE AREAS

Current Forest Plan	LUD 1	LUD 2	LUD 3	LUD 4
Total Forest	35%	18%	19%	28%
Percent of Land Use Designation in Tentatively Suitable Forest Land				
Inventoried High Visual	12%	9%	19%	13%
Scheduled High Visual	NA	NA	5%	4%
Percent Inventory/Scheduled	NA	NA	28%	34%
Inventoried Medium Visual	6%	4%	6%	8%
Scheduled Medium Visual	NA	NA	2%	5%
Percent Inventory/Scheduled	NA	NA	41%	61%

(Source: TLMP Photo Points Database, 1979)

Visual Management System

The USDA Forest Service developed the Visual Management System as a means to standardize the treatment and inventory of scenic resources on the National Forest. In 1980, the Tongass National Forest initiated phase one of the Visual Quality Objective inventory with completion of the Sensitivity Level mapping.

Sensitivity Levels

Sensitivity levels provide a method to measure the importance of viewed landscapes, and reflect concerns of person(s) viewing the landscape. On the Tongass, sensitivity Level 1 areas are typically high use roads or trails, the Alaska Marine Highway, highly used marine travel routes, campgrounds, or developed recreation sites visited by persons with a moderate to high degree of concern for scenic quality. Sensitivity Level 2 travel routes or use areas are those which receive less use, with the viewer having a moderate degree of concern for visual quality. Sensitivity Level 3 areas are not seen from any of the above areas and receive the least use along travel routes or other areas.

Sensitivity Level mapping was completed in 1980. The map was signed by Regional Forester, John Sandor. As a result of project planning and implementation (i.e. new road or recreation site construction), some updating has occurred since then.

Variety Classes

The second step in the mapping process is the delineation of variety classes, which indicate scenic quality. The six Visual Character Types on the Tongass provide a frame of reference for the variety class inventory. Each character type has unique features associated with its location such as the Coast Range, Baranof Highlands and so on. Each character type provides a frame of reference for the variety class inventory. The three variety class designations are: Class A - Distinctive, Class B - Common, and Class C - Minimal. Class A landscapes have outstanding or unusual features of landform, vegetative patterns, waterforms or geologic features. Class B landscapes tend to be common throughout the character type with no outstanding features. Class C landscapes have minimal variety in form, line, color or texture.

Distance Zones

The third step in the inventory process is the distance zone mapping. Using the travel routes from the sensitivity level map, distance zones were mapped using standard distances from the travel route. Foreground areas are those seen from the viewer to one-quarter mile away. Middleground areas are seen from one-quarter mile to three to five miles. Background areas are those seen from three miles to infinity.

VISUAL QUALITY OBJECTIVES

These three elements--sensitivity levels, variety classes, and distance zones--are then combined to form inventory Visual Quality Objectives (VQO's), which provide a basis for measurable standards or objectives for managing the visual resource. They are based on the number of people viewing the landscape, public concern for scenic quality (sensitivity levels) of the landscape and the diversity of natural features in the landscape (variety class) in relation to the distance from which the landscape is seen (distance zones). The resulting mapped areas, when combined, form any one of four Visual Quality Objectives: Retention, Partial Retention, Modification and Maximum Modification.

In the Forest Planning process, VQO's are integrated into each of the prescriptions. With completion of the Forest Plan and selection of the preferred alternative, VQO's are "adopted" and provide direction and guidance when the Forest Plan is implemented. At the project level, these adopted VQO's provide the Ranger and District staff a visual objective to strive for in their on-the-ground planning process. In some cases, the adopted VQO may not be met as a result of a decision made by the responsible official.

Table 3-148 displays the relationship of inventoried VQO's to the current Land Use Designations. To date, LUD 1 areas (Wilderness Areas), have not been inventoried. The VQO for LUD 1 areas is Retention, which is consistent with the intent and guidance provided by ANILCA. The greatest percent of lands with high visual sensitivity (Retention and Partial Retention) are located within LUD 3 seen areas. The LUD designation recognizes the presence of amenity values (recreation/visual/wildlife resources) while allowing some timber harvest to occur. Similarly, the greatest percent of Maximum Modification areas are located in LUD 4 not seen from travel routes or use areas.

Visual Quality Objectives Definitions

Visual Quality Objectives are a desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. The following terms define the degree of acceptable alterations that can be made in a characteristic landscape.

Retention — Landscapes in this setting are visually sensitive to change. Activities are designed to not be visually evident to the forest visitor.

Partial Retention — Management activities may be evident, but remain visually subordinate to the characteristic landscape.

Modification — This objective provides for management activities which may dominate the characteristic landscape, yet are designed to borrow from existing form, line, color and texture found in the landscape.

Maximum Modification — Management activities of vegetative and landform alteration may dominate the characteristic landscape. When viewed as background, these activities should appear as a natural occurrence.

TABLE 3-148
INVENTORY VISUAL QUALITY OBJECTIVES

Inventory Visual Quality Objective	LUD 2	LUD 3	LUD 4
SEEN AREAS			
Retention	533,401	341,325	188,648
Partial Retention	642,484	1,126,464	901,880
Modification	116,432	317,137	612,841
Maximum Modification	1,980	4,652	12,502
UNSEEN AREAS			
Retention	0	580	1,262
Partial Retention	542,103	127,767	445,414
Modification	669,440	516,812	581,481
Maximum Modification	154,433	356,463	1,400,868

(Source: Revision Database 9/15/89, Q47)

EXISTING VISUAL CONDITION (EVC)

The Existing Visual Condition (EVC) inventory is an assessment of how management activities have affected the appearance of the visual resource as measured against the natural-appearing landscape. The visual condition of the Forest is dependent on a variety of factors. The timber sale program, road construction, log transfer facilities, recreation sites, administrative sites, fish enhancement projects, etc. have affected the visual characteristics of many areas.

Table 3-149 provides a summary of the Forest's existing visual condition by Land Use Designation (LUD). Seen areas are defined as those areas visible from marine or land based travel routes, small plane routes or use areas in either the foreground, middleground or background distance zones.

In LUD 3 areas, where amenity resource values are to be considered as well as timber resource values, 20 percent of the seen area and 10 percent of the unseen area of the Forest exists in a Moderately to Drastically Altered visual condition. In contrast, in the LUD 4, where timber commodity values are emphasized, 33 percent of the seen area and 37 percent of the unseen area exists in a Moderately to Drastically altered visual condition.

Existing Visual Condition (EVC) Definitions

Existing condition ratings are established to give the land manager a current level of visual quality and visual evidence of management activities. The following are the Existing Visual Condition classes.

Type I	Areas are untouched by human activities
Type II	Changes in the landscape are not visually evident
Type III	Changes in the landscape may be noticed by the forest visitor
Type IV	Changes in the landscape are easily noticed by the forest visitor
Type V	Changes are dominant and obvious to the forest visitor
Type VI	Changes are in glaring contrast to the forest landscape.

TABLE 3-149
EXISTING VISUAL CONDITION

Existing Visual Condition Class	LUD 2	LUD 3	LUD 4
SEEN AREAS			
Natural Condition (Type I)	1,270,981	1,470,955	1,223,963
Natural Appearing (Type II)	12,662	12,869	8,437
Slightly Altered (Type III)	5,791	43,410	53,119
Moderately Altered (Type IV)	3,724	65,772	133,271
Heavily Altered (Type V)	1,139	191,879	260,808
Drastically Altered (Type VI)	0	4,694	37,539
UNSEEN AREAS			
Natural Condition (Type I)	1,356,987	871,426	1,921,394
Natural Appearing (Type II)	159	2,040	1,180
Slightly Altered (Type III)	5,472	1,719	13,257
Moderately Altered (Type IV)	2,100	43,022	99,740
Heavily Altered (Type V)	1,257	78,951	352,870
Drastically Altered (Type VI)	219	4,604	33,811

Source: Tongass Revision Database, Query 48

VISUAL ABSORPTION CAPACITY (VAC)

Visual Absorption Capacity (VAC) is an estimate of the relative ability of a landscape to accept management manipulations without its visual character being significantly affected. It provides the basis to help decide where to locate activities while attaining adopted visual quality objectives.

VAC ratings of High, Intermediate and Low were derived from the Revision Database using the factors of slope, variety class and distance zones. Areas of least slope (0-35 percent) would comprise a High VAC rating, 35-65 percent an Intermediate rating, and slopes greater than 65 percent a Low VAC rating. Variety Class ratings were selected to describe the landscape complexity component in VAC (Landscape Architect Task Force meeting 9/30/87). Class A landscapes reflect a high degree of complexity and interest, Class B a moderate degree, and Class C landscapes reflect the least variety or interest. Distance zones indicate the most common position from which a landscape is seen. The closer the viewer is to the landscape, the more sensitive that landscape is to change.

A Low VAC setting generally has steep slopes, little variety or complexity in its landscape character and is seen in the foreground to middleground distance zone. Sixty percent of the areas seen from Sensitivity Level 1 travel routes are in a Low VAC setting. In Sensitivity Level 2 travel routes, 79 percent of the areas are in a Low VAC setting.

POTENTIAL

Eighteen percent of the unroaded areas on the Tongass National Forest are of high visual sensitivity (Sensitivity Level 1--high use areas where visitors have a high concern about scenic quality). On the basis of total acreage, 32 percent of the Tongass land base is designated Wilderness, insuring some long-term potential for retaining scenic quality. Much of the wilderness acreage is, however, located away from the readily accessible marine-related areas adjacent to communities, the Alaska Marine Highway and the more heavily used small boat routes. (Source: Revision Database 9/15/89, Query 52)

In unroaded portions of the Forest excluding Wilderness Areas, 18 percent are visible from a Sensitivity Level 1 travel route or use area, and 8 percent are visible from a Sensitivity Level 2 travel route. Of these Sensitivity Level 1 seen areas or viewsheds, 27 percent is within areas considered to be tentatively suitable forest land. Thirty-five percent of Sensitivity Level 2 is tentatively suitable.

Scenic "potential" may also include an increased ability to view landscapes which are currently inaccessible. New roads adjoining communities, new trails and increased cruiseship operations provide greater opportunities to view the Tongass.

In 1988, the Forest Service initiated a program to designate scenic stretches of National Forest roads as National Forest Scenic Byways. Less than one-third of the 340,000 miles of road in the National Forest System were designed for passenger cars; these roads go through some of America's most spectacular country. The scenic byways program will identify and designate the most scenic stretches of these roads for visitors to enjoy, emphasizing interpretation of forest activities and partnerships with other organizations. Through this program, the Chief of the Forest Service hopes to showcase the beauty and working aspects of the 156 National Forests in the United States.

The Alaska Marine Highway has potential to be designated a National Forest Scenic Byway. The ferry system provides access to the Inside Passage from Bellingham, Washington to Ketchikan to as far north as Skagway and west to Sitka. It is a "highway" in the sense that it links many of the communities of Southeast Alaska in the same way that land based roads do elsewhere.

DEMAND ASSESSMENT

Demand for scenic quality can best be represented by the increase in tourist-related travel to the Tongass as well as a heightened awareness and sensitivity of Alaskan residents to scenic resource values. From 1975 to 1983, cruiseship visitation increased by 115 percent and ferry system usage increased by 33 percent (Bright, 1985).

Southeast Alaska's Inside Passage is advertized and promoted by the Division of Tourism, cruiseship operators, and Southeast Alaska Tourism Council. Their marketing strategy focuses on the scenery of the Tongass National Forest as a major attraction. The visitor to Southeast Alaska would therefore arrive with expectations and an image of the environment and scenery awaiting them. "The current trend in both State and private industry advertisements capitalize on the scenic splendor of the state, particularly Southeast" (Bright, 1985).

One of the most important findings of the Alaska Public Survey was "the importance of the Region's natural resource base in providing an attractive setting in which to live and recreate... For many, the importance attached to and satisfaction derived from the region's environmental setting overshadowed the economic opportunities that the natural resource provided."

FUTURE DEMAND

If current trends continue, demand for viewing scenic landscapes will increase. Lands adjacent to the Alaska Marine Highway, cruiseship routes, small plane/flightseeing routes, high use recreation areas, and other marine and land based travel routes will be seen by more people, more frequently, and for greater durations.

INTRODUCTION TO EXISTING DIRECTION

Existing direction for visual resource management is found in a number of documents, including the Tongass Land Management Plan and the Alaska Regional Guide. Significant direction statements and the results of their implementation are presented below.

EXISTING DIRECTION 1

"Recognize and protect lands having special values such as boat anchorages, small boat routes, ferry and cruiseship routes, recreation beaches, popular deer hunting areas, wildlife observation areas, sport-fishing streams and trails as part of the land management planning process" (Alaska Regional Guide).

RESULTS OF TLMP IMPLEMENTATION

These areas are recognized through the application of the visual management system. Sensitivity Levels are applied to travel routes and use areas and reflect people's concern for the scenic quality of the National Forest. Sensitivity Level 1 areas have high use, are used for long duration, or are viewed by persons with a high degree of concern for the visual resource. Water bodies with high use, such as fishing and boating areas, as well as major marine travel routes, are also rated Sensitivity Level 1. Sensitivity Level 2 travel routes are of local importance, receive moderate to low use, and are used with a shorter duration than those of Sensitivity Level 1 areas. They address marine or land based routes as well as small plane routes.

These areas have been protected, in some cases, through intensive visual management (i.e.: reduced unit size, increased timber management unit dispersion, shaping, etc). TLMP provided a degree of "protection" through the applications of LUD's and extended rotations in areas of high and medium visual sensitivity. In other cases, the decision was made to defer management activities in response to public concern for the area.

Table 3-150 compares the current Land Use Designations to Existing Visual Condition (EVC) ratings. The LUD's have been broken down by areas of highest visual sensitivity (Sensitivity Level 1) and moderate visual sensitivity (Sensitivity Level 2) and by distance zone. The results then describe the current visual condition of the Forest landscape in relation to TLMP projections. As an example, in a LUD 3 setting, if areas of high visual sensitivity displayed a great quantity of EVC rating types 5 or 6, it would indicate that activities in that land use designation were not consistent with the Forest Plan (TLMP).

EXISTING DIRECTION 2

"Schedule resource development activities in areas that will not adversely impact currently utilized and other important recreation and visual resources to the extent possible." (Alaska Regional Guide)

RESULTS OF TLMP IMPLEMENTATION

In some cases, activities have been scheduled to minimize adverse impacts to the visual resource. The TLMP schedule did not fully address visual resource concerns, particularly since the nationwide Visual Resource Management program had not yet been developed and available for use. In long-term timber sale areas, attempts are made to minimize the effects of a rigorous and development-oriented harvest schedule. The independent timber sale program has greater flexibility in scheduling resource development activities through the interdisciplinary planning process.

TABLE 3-150
EXISTING VISUAL CONDITION RATINGS BY LAND USE DESIGNATION

Land Use Designation (LUD) by sensitivity levels	Existing Visual Condition Type I no change	II not evident	III slight	IV moderate	V great	VI drastic
LUD 2						
Level 1: Total	988,366	9,807	3,329	1,777	299	0
Foreground	197,493	9,267	2,571	478	0	0
Middleground	664,009	520	738	1,299	299	0
Background	126,864	20	20	0	0	0
Not Seen	0	0	0	0	0	0
Level 2: Total	281,075	2,855	2,362	1,946	840	0
Foreground	73,620	2,815	601	1,385	540	0
Middleground	193,525	40	1,761	561	300	0
Background	13,930	0	0	0	0	0
Not Seen	0	0	0	0	0	0
LUD 3						
Level 1: Total	1,087,557	9,704	36,843	41,913	121,891	580
Foreground	222,284	6,584	14,984	12,556	18,997	480
Middleground	718,456	3,040	16,541	27,164	88,951	100
Background	146,817	80	5,318	2,193	13,943	0
Not Seen	0	0	0	0	0	0
Level 2: Total	393,328	3,165	6,566	23,898	71,009	4,776
Foreground	101,987	2,705	4,621	8,435	27,113	2,179
Middleground	265,596	460	1,945	15,423	41,574	1,935
Background	15,596	0	0	0	1,301	0
Not Seen	9,688	0	0	40	1,021	662
LUD 4						
Level 1: Total	617,955	5,259	25,271	55,654	111,929	18,534
Foreground	96,863	1,919	11,177	10,173	8,681	5,698
Middleground	373,212	2,381	14,054	36,271	76,213	12,496
Background	146,638	959	40	9,130	27,035	340
Not Seen	1,242	0	0	80	0	0
Level 2: Total	613,687	3,178	27,848	77,517	149,379	17,005
Foreground	172,241	2,439	12,308	25,535	57,553	11,067
Middleground	397,540	120	15,178	50,524	85,171	7,938
Background	31,355	119	362	1,458	6,155	0
Not Seen	12,551	0	0	0	500	0

Source: Revision Database 9/15/89, Query 53
Note: Sensitivity Level 3 is not included, therefore, total acres of Level 1 and Level 2 cannot be compared with overall LUD acreage.

In other cases, timber projects were proposed in areas designated for development in TLMP. Following resource evaluation these projects were deferred, usually due to sensitive issues associated with project location and the economic situation of the 1980's. The following areas have been deferred from timber harvest: Honker Divide, Crystal Mountain, Cowie-Davies, Salmon Bay Lake, Back Channel, Berner's Bay, Woewodski Island, Mad Critter, Cleveland Peninsula, Chuck River and

Cholmondeley Sound. These areas are not within currently designated Moratorium areas.

EXISTING DIRECTION 3

"In areas where Forest Plans have indicated that primary emphasis is on commodity production, minimize adverse impacts on the recreation and visual resources of the area. ....Protect important visual values without significant decrease in commodity outputs by full utilization of implementation measures available to meet adopted visual quality objectives established as a result of the Forest planning process." (Alaska Regional Guide)

RESULTS OF TLMP IMPLEMENTATION

Efforts to minimize adverse visual impacts in areas of commodity emphasis (LUD 4 areas) may result in some improvement to visual quality, but the cost associated with this is very high. During project planning, landscape architects are involved in the mitigation of visual impacts. Mitigation measures may include: shaping and location of harvest units, spacing requirements, working with landform characteristics and natural openings, etc. TLMP did not provide Visual Quality Objectives as we know them today, but identified areas of high and medium visual sensitivity, where extended rotations were applied to provide adequate latitude for meeting visual resource needs. The commodity emphasis in LUD 4 areas often precludes fully addressing and resolving visual resource concerns.

EXISTING DIRECTION 4

"Even-aged harvest cutting methods are prescribed for all species, except where uneven-aged management is needed to meet other resource objectives. Clearcutting to regenerate an even-aged stand will be used as a cutting method only where such practice is determined to be optimum to meet the objectives and requirements of the Forest Plan, and can be carried out in a manner consistent with the interdisciplinary process for the protection of soil, water, fish and wildlife, recreation, visual resources, and the regeneration of the timber resource." (Alaska Regional Guide)

RESULTS OF TLMP IMPLEMENTATION

Clearcutting is the primary harvest method on the Tongass and is not always compatible with visual resource objectives. Steep, evenly sloped landscapes facing marine travel routes and boat anchorages pose the greatest challenge in minimizing overall visual impacts. Uneven-aged management prescriptions have had limited applications in areas of high visual sensitivity, and have not been deemed economically feasible in the market conditions of the last ten years. To date, little research has been completed on the Tongass to verify whether a "healthy" stand can be maintained through uneven-aged management over the long term in the spruce/hemlock forests.

EXISTING DIRECTION 5

"Each project will be monitored to evaluate the adequacy of management practices. Information collected in this process will be used to recommend improvements or changes in the planning of future activities." (Alaska Regional Guide).

RESULTS OF IMPLEMENTATION

Each Area does informal monitoring usually in conjunction with other project work. Aerial observation, photographing implemented projects and functional assistance trips with Regional Office representatives are methods by which visual resource monitoring occurs. Regional direction has been established (R10 FSH 2309.22) for monitoring the visual resource, although documentation of the monitoring results and the use of the findings is not consistent across the Tongass.

The two long-term sale environmental documents include monitoring plans which outline the visual resource monitoring process.

EXISTING DIRECTION 6

"When openings are created in the forest by the application of even-aged management, the openings will be shaped and blended with the natural terrain to achieve aesthetic quality and wildlife habitat objectives to the extent practicable. Openings will be located to achieve the desired combination of multiple objectives." (Alaska Regional Guide).

RESULTS OF TLMP IMPLEMENTATION

Landscape architects on the Tongass are involved to varying degrees in the location, design and shaping of harvest units, with their efforts concentrated in areas of high visual sensitivity. The use of computer simulation techniques (Perspective Plot and NewPerspectives software) provides a means to evaluate the potential impacts of harvest units, and indicates where a design change may be needed. Openings created for recreation, administrative, fisheries enhancement and timber objectives require assistance from the landscape architects on the Tongass, to insure visual objectives are addressed and integrated into the project proposal.

EXISTING DIRECTION 7

"The extended rotation of 120 years for identified areas in LUD IV and 200 years in LUD III were assumed to provide sufficient latitude needed to meet Area Guide policies for recreation and visual quality." (TLMP Evaluation Report, November 1984, p. 152)

RESULTS OF TLMP IMPLEMENTATION

The use of extended rotations to meet visual resource objectives has provided a means of recognizing areas of high visual significance. These areas reflect high visual sensitivity as viewed from the Alaska Marine Highway, other waterways, roads and trails, Forest Service recreation cabins, areas associated with communities, administrative sites, saltwater fishing areas, and other recreation sites. Each Area applies the extended rotation acreages during Implementation Analysis or project level work. Initially, there was confusion on how to apply the concept and therefore its use was not consistent across the Tongass. In a letter of direction (TLMP Retention Factors, July 1983, by John Sandor, Regional Forester) process and intent were clarified. This direction is still current.

Twenty-five percent of LUD 3 areas (total area) were identified as having high visual sensitivity. Twenty-two prcent of these areas were scheduled for timber harvest of which, 99 percent were to receive an extended rotation of 200 years. In areas designated LUD 4, 18 percent of the total area were recognized as having high visual sensitivity. Twenty-five percent of these areas were scheduled for timber harvest of which, 58 percent received an extended rotation of 120 years (Source: TLMP Amendment, 1985-86 and RO-TM)

In the Alaska Pulp Corporation (APC) and Ketchikan Pulp Company (KPC) long-term sale areas, timber harvest commitments have precluded implementing the extended rotation concepts in many roaded and marine-oriented viewsheds. Many of the areas with high visual sensitivity are old-growth stands or stands in the early stages of second-growth management. The extended rotation concept has been applied to areas seen from high use recreation sites.

In April 1988, the forest landscape architects completed a study to determine when "an opening is no longer considered an opening" from the visual resource perspective. The project was initiated upon request of the Regional Forester to provide input for revising the Forest Plan. Results of the study recommended a variety of timber harvest rotations and systems necessary to meet specified Visual Quality Objectives. Rotations were established for Retention, Partial Retention, Modification and Maximum Modification VQO settings. These rotations reflect the ability of the landscape to absorb management activities (Visual

Absorption Capability). The resulting time frames were incorporated into the Revision's FORPLAN analysis factors. This study found that the 120 and 200-year rotations in TLMP were not sufficient to meet visual resource objectives in sensitive foreground areas with steep side slopes (Source: Harvest Intensity and Visual Management Considerations, September 1989).

EXISTING DIRECTION 8

The following direction is "Plan Implementation Direction" found in Tongass Land Management Plan as amended, Winter 1985-1986. This particular section follows a discussion of retention factor methods used in TLMP. This section is included because it provides further refinement and direction necessary to properly implement the Forest Plan.

(2). Comparison of Operable CFL Needed for Visual Resource Coordination Purposes with Original Acres Retained.

[a]. As part of Step (b) of the Area Analysis Process, analyze the MA(s) or VCU's to generate inventoried Visual Quality Objectives (VQO's), using the methodology described in FSM 2383 and R10 FSH 2310.22. This analysis should take advantage of existing work of this kind already completed on the Tongass.

[b]. As part of Step (c) of the Area Analysis Process, define alternative VQO's as part of the formulation of alternatives.

[c]. As part of Step (d) of the Area Analysis process, identify those areas in which VQO's can be met through extended rotations, i.e. 120 years in LUD IV and 200 years in LUD III. This would normally involve those areas identified as visual management Class 1 and the more restrictive Class 2 areas (refer to R10 FSH 2309.16). ... Compare and record the acres of operable CFL identified for extended rotation in each alternative with the CFL acreage identified for extended rotation in TLMP. This comparison will be documented and used by the Forest Supervisor as one factor in selecting a preferred alternative. To meet identified coordination needs, the preferred alternative may have more or less operable CFL scheduled for extended rotations than originally calculated in this Plan.

The VQO prescriptions that are to apply in implementing proposed project(s) will be approved by the Forest Supervisor. The prescriptions and areas they apply to, will remain in effect until amended to reflect improved information or changes in environmental conditions. The number of acres of operable CFL which are to be managed on an extended rotation basis to implement the VQO prescriptions will need to be determined for Monitoring and Evaluation purposes. (TLMP, as amended, Winter 1895-1986, p. 203)

RESULTS OF TLMP IMPLEMENTATION

[a]: This is done during Area Analysis and project level work.

[b]: In most cases, Alternative VQO's are used to display the differences between alternatives, not as a means to recognize areas requiring special consideration due to high recreation or public use. In the case of the APC Long-term Timber Sale Contract, VQO's were adopted which reflected LUD designation of the area (commodity vs. amenity orientation).

[c]: In some cases, areas were mapped which should receive extended rotations, yet were not recorded. The mapped areas generally conformed to areas seen in the foreground and middleground from Sensitivity Level 1 or 2 travel routes. The Forest Supervisor approves VQO's by signing the NEPA document, which displays the range of Visual Quality Objectives and effects to the visual resource. The land is managed under those adopted VQO's.

OPPORTUNITIES

There are opportunities to:

- Study uneven-aged management issue, as suggested in the Pan Sylvan report, 1983
- Designate the Alaska Marine Highway a Scenic Byway, recognizing the significant role it plays in the economic and social environment of Southeast Alaska.
- Evaluate the monitoring program as described in R10 FSH 2309.22, incorporate concepts into the Forest Plan revision.
- Update and refine the visual resource inventory through project level work and public scoping, incorporating new information into the Tongass Database.
- Establish specific standards and guidelines that will increase the potential to meet adopted visual quality objectives.
- Use state-of-the-art computer simulation techniques to evaluate visual resource impacts and need for mitigation on a project level basis.

WATER

OVERVIEW

The interactions of water on the Tongass National Forest are characterized by the hydrologic cycle. This cycle is dominated by a maritime climate which brings rain nearly year-round with the heaviest amounts from October through February. Any physical activity in the environment affects the hydrologic cycle in some manner, but the principal points of interaction can be grouped into climate, streamflow regimen, water quality, and water use. This cycle is essentially tied with several other natural systems and cycles including wetlands, riparian ecosystems, fish and wildlife use of aquatic/riparian ecosystems, floodplains as part of the aquatic/riparian ecosystems, and the forest ecosystem. This section will describe characteristics of the hydrologic cycle, wetlands, and floodplains which are unique to the Tongass National Forest. Details of the Aquatic/Riparian ecosystems are described as a separate part of this Chapter.

SUPPLY/INVENTORY
..Existing

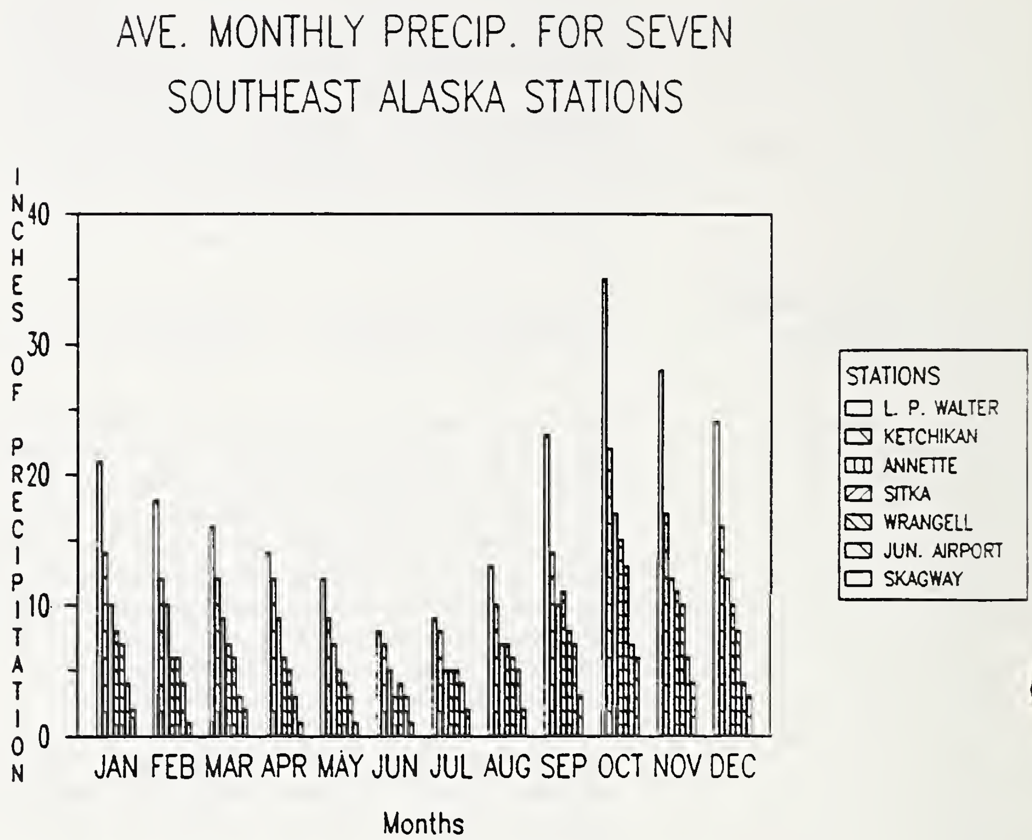
The water resources of the Forest can be broken into seven areas of consideration. These are: (a) climate, (b) streamflow regimen, (c) water quality, (d) floodplains, (e) wetlands, (f) water use and (g) riparian areas.

Climate

The climate and weather in Southeast Alaska have a strong maritime influence. Dominant pressure cells, known as "Aleutian Lows," are spawned in the North Pacific by the Japanese current and the cold Arctic down drafts. Offshoots of the cells move southeastward and push into the Alaskan/British Columbia coastal area bringing in relatively warm, moist air. When these pressure cells meet the rugged coastline, they produce strong winds and large amounts of precipitation. Sea level precipitation in Southeast Alaska ranges from 30 inches at Skagway to 220 inches per year at Little Port Walter. It is estimated that average annual precipitation may be as high as 400 inches on the southern end of Baranof Island and about 260 inches over the Juneau Icefield. Figure 3-55 shows the individual monthly average precipitation for seven sea level communities in Southeast Alaska, while Figure 3-56 shows the total monthly average precipitation for Southeast Alaska. Southeast Alaska has complete cloud cover about 85 percent of the year. Snowfall varies according to elevation and distance inland from the coast.

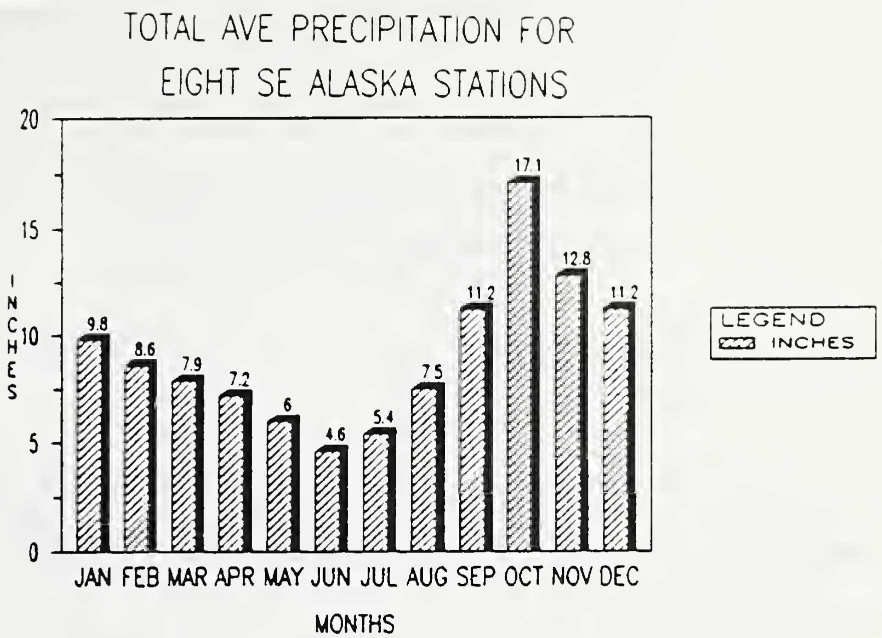
Yearly precipitation distribution is quite uniform over Southeast Alaska with geographic areas varying in amounts. Figure 3-57, "Accumulated Monthly Precipitation in Inches," shows this pattern in Southeast Alaska. October is generally the wettest month. High precipitation persists through the middle of November when intermittent snowfall occurs. Except in the northern half panhandle, snow accumulation below 500 foot elevations is short-lived, generally melting off within a few days, due to warmer temperatures and rain. The panhandle has persistent low elevation snowpacks December through March. At the higher elevations and on the northern part of the Forest, the snow cover usually persists until the spring. From the latter part of March through the latter part of June, rain dominates the weather scene. July and August are, on average, the drier months. Rain becomes more frequent and of greater duration during September.

FIGURE 3-55
AVERAGE MONTHLY PRECIPITATION FOR SEVEN SOUTHEAST ALASKA STATIONS



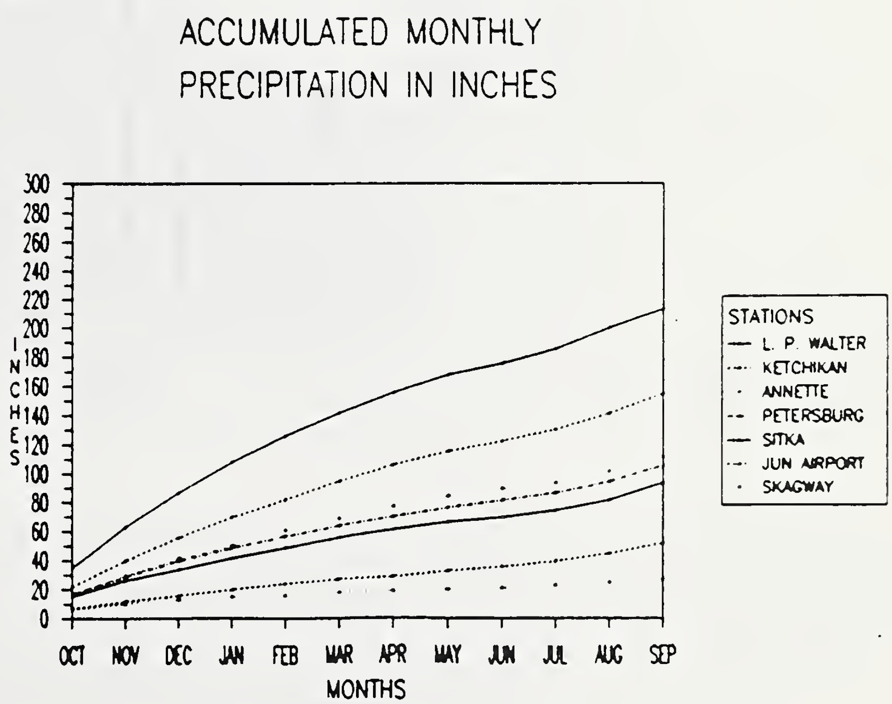
Source: Climatography of the United States No. 81-4, Decennial Census of U.S. Climate. Stations include Ketchikan, Annette, Sitka, Wrangell and Juneau Airport. This graph shows average monthly precipitation for the above seven stations. It also shows the uniform distribution pattern of precipitation throughout Southeast.

FIGURE 3-56



Source: Climatography of the United States No. 81-4 Decennial Census of U S Climate. This graph includes all stations in the Southeast Alaska climatological

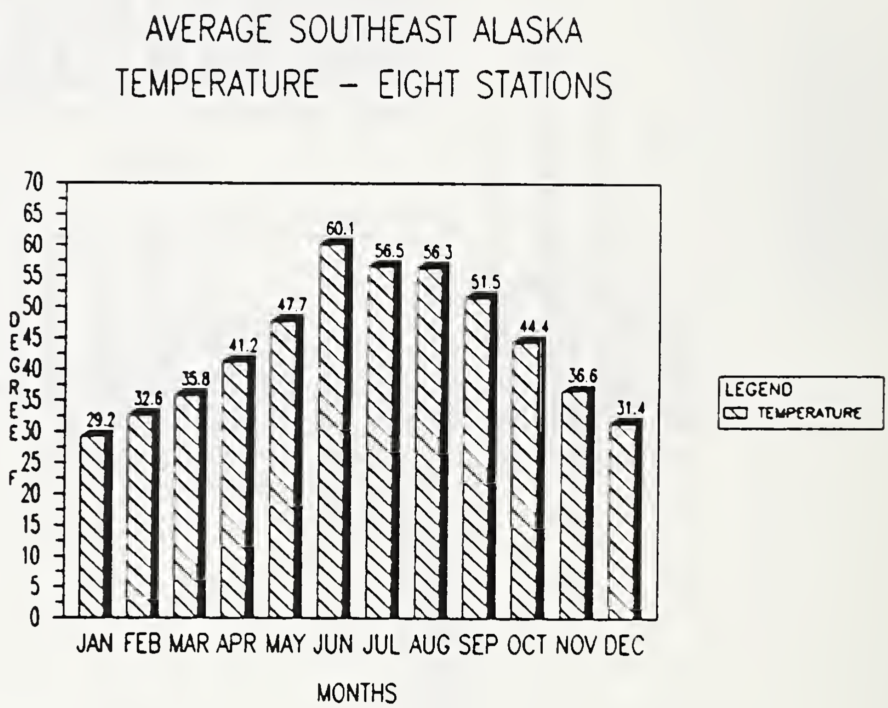
FIGURE 3-57



Source: Climatography of the United States No. 81-4. Decennial Census of U.S. Climate. This graph shows the uniform distribution pattern of precipitation throughout Southeast even though there are different levels of precipitation due to geographic locations. It also shows the total yearly precipitation differences in Southeast Alaska.

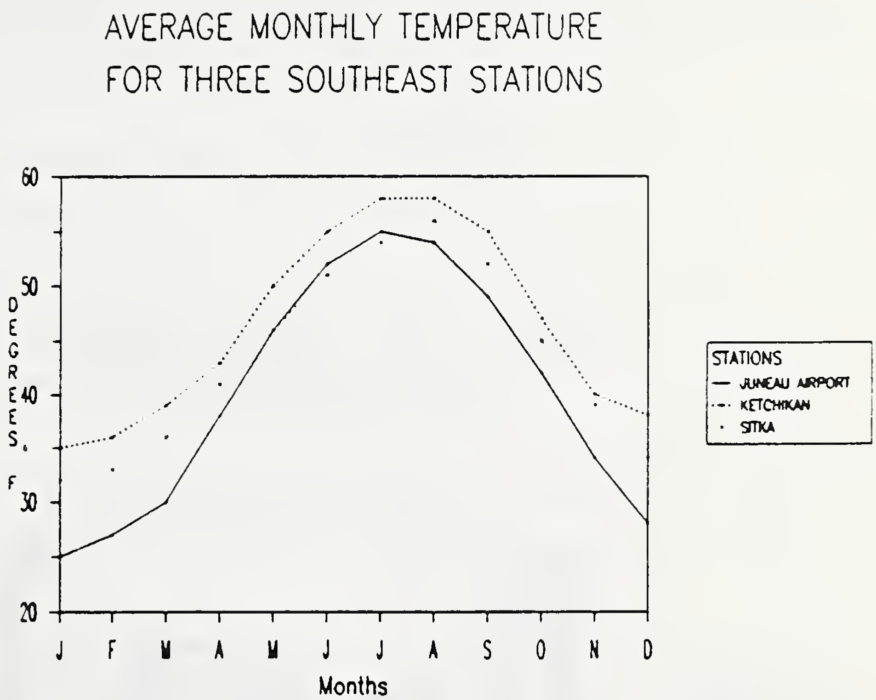
The Pacific maritime influence holds the daily and seasonal temperatures within a narrow range. Temperatures average near 32 degrees Fahrenheit in the winter and 60 degrees Fahrenheit in the summer. Due to the fact that all the recording stations are at sea level, recorded temperature trends over Southeast are fairly uniform. The average monthly temperatures plotted (Figure 3-58) for all official stations show this similarity. Figure 3-59 shows the temperature variations between the southern part of Southeast to the northern part of Southeast.

FIGURE 3-58
AVERAGE SOUTHEAST ALASKA TEMPERATURE



Source: Climatography of the United States No. 81.4, Decennial Census of U.S. Climate. The average temperature is a monthly average of the stations in the Southeast Climatological Division.

FIGURE 3-59
AVERAGE MONTHLY TEMPERATURE FOR THREE SOUTHEAST STATIONS.



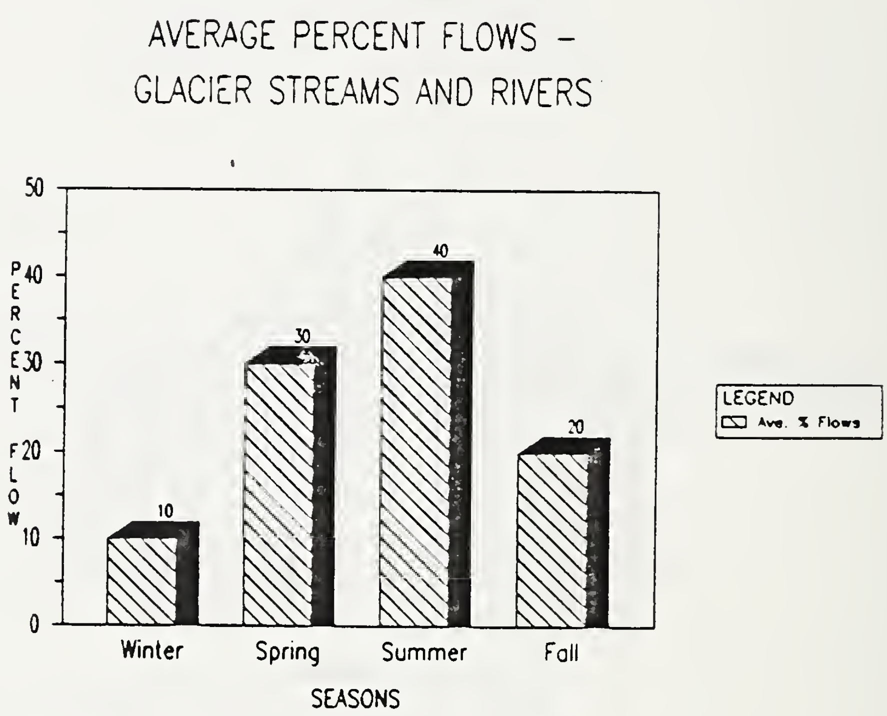
Source: Climatography of the United States No. 81.4, Decennial Census of U.S. Climate. The average monthly temperature decreases from the southern part of Southeast to the northern part of Southeast.

Stream Regimen

Both glacial and non-glacial river and stream systems are located on the Tongass. Most glacial rivers originate in glacier and snow fields of the Coast Range and St. Elias Mountains and are located on the mainland, with some of the largest mainland rivers having glacial origins in Canada. Mainland streams, for the most part, flow westward. Island rivers and streams usually drain east or west to tidewaters.

All glacial and coastal island streams and rivers produce a large volume of water per unit of land. Runoff varies greatly between the mainland and island rivers and stream systems. Glacier and high elevation snowmelt are streamflow regulators for mainland rivers. Runoff from these glacially-fed streams usually begins in June in response to snow and icemelt with peak flows reached in July and August. October sees runoff drop rapidly, due to colder temperatures at higher elevations with low base flows occurring between December and April. Seasonal variations in percent of flow are shown in Figure 3-60.

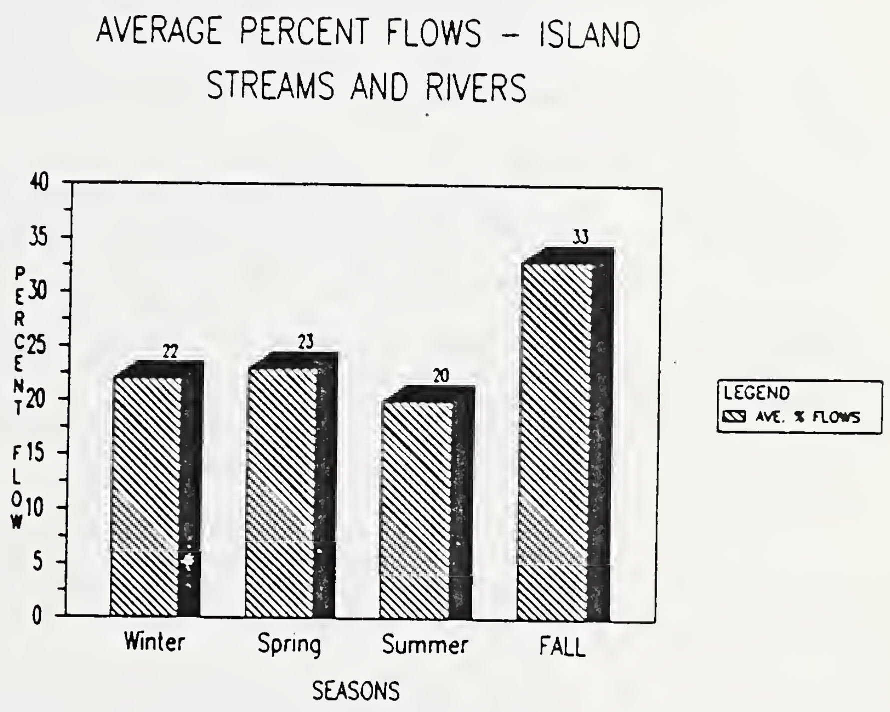
FIGURE 3-60
AVERAGE PERCENT FLOWS - GLACIER STREAMS AND RIVERS



Source: U.S. Geological Survey surface water records. Average percent flows for a glacial river in Southeast Alaska. The higher percentage of discharge flows in the spring and summer is due to snow and glacial ice melting.

In contrast the average runoff of island streams and rivers and nonglacial streams in the Yakutat Forelands is very uniform with the highest runoff and flows occurring as the result of fall storms with high amounts of precipitation and moderately warm temperatures between October and December. Spring snowmelt is the likely cause of increased runoff between April and June. Spring runoff can often approach fall runoff volumes especially in some streams on Baranof and Chichagof Islands. Two low-flow periods are characteristic of these systems, the first low flow occurs between January to March due to snow and ice accumulation and the second during mid-July to August due to lack of precipitation. Seasonal variations in percent of flow are shown in Figure 3-61.

FIGURE 3-61
AVERAGE PERCENT FLOWS - ISLAND STREAMS AND RIVERS



Source: U.S. Geological Survey surface water records. Average percent flows for seven island streams and rivers in Southeast Alaska. The higher percentage of discharge flows for fall period is the result of high rainfall during the fall months.

During the past 30 years, extensive timber harvest has been conducted on several island watersheds. Investigations on watershed responses to timber harvest on Prince of Wales Island began in 1949 and and extended into the early 1960's. Studies were initiated on Harris, Maybeso, and Indian Creeks using Indian Creek as a control watershed. The final report of this analysis showed no significant change in water yield or peak flows after clearcut logging (Meehan et al. 1969). Although a response to clearcutting undoubtedly occurred, due to gauging station locations, it was too small to be detected.

In 1978, Bartos (1989) conducted an investigation on streamflow response after timber harvesting on the Staney Creek drainage on Prince of Wales Island. The increased discharge (water yield) was concentrated in the lower to mean flows, and the peak flows showed little or no significant effect from timber harvesting activities. Low flow water yield increases were detectable only after 30-35 percent of the watershed had been harvested. Increases in the low to mean flows can be attributed to the reductions in precipitation interception and evapotranspiration. Patric (1966) in a study near Juneau found an 11-inch rainfall interception loss in an old-growth western hemlock and Sitka spruce forest. When this is added to losses due to evapotranspiration, the annual precipitation loss may exceed 24 area inches, although not all interception and evapotranspiration losses become increased stream runoff.

Whether the same response is occurring due to clearcutting in the northern half of the Forest, which generally has coarser-textured soils and steeper mountain terrain, has not been determined. Due to the higher significance of alpine areas as water storage and release areas, stream flows on the Northern part of the Forest are probably less affected by timber cutting.

Watershed Cumulative Effects Model

To evaluate the response of watersheds to management activities a cumulative effects index model was developed. This two-part model first develops a physical response index of watersheds in natural condition, and second, a index of response to potential disturbances caused by timber harvest or road construction or both to a watershed.

A watershed's physical condition index (P_{si}) is determined by the drainage area, size of natural landslides per slope class, length of Class III streams, weighted channel gradient, size of natural landslides reaching fish streams, and percent of "in channel" lakes.

The second part of the model is divided into two segments: timber harvest and road construction. The timber harvest response indices (M_{ti}), consider percent timber harvest, drainage area, size of potential landslides on harvested areas, and size of potential landslides in harvested areas reaching fish streams. For the roading response indices (M_{ri}), road density replaces percent timber harvest in the equation.

The physical response indices for watersheds' natural conditions are listed for each VCU in Appendix L. (This information is not currently available - January 1990).

Stream Channel Classification

In the early 1980's a method of inventorying channel types was developed on the Forest to identify, classify, and map the distinguishing parts of streams or river systems (Marion et al. unpub. 1986). This inventory system provides a process for defining stream and river channel characteristics and predicting their response to management or naturally-caused changes. Channel type data

helps define various stream parts and, as such, is a tool intended to complement drainage basin management, not replace it. The inventory system also stratifies watershed stream and lake habitats into distinctly different groups which are useful in inventorying and assessing watershed condition, fish habitat production capability, and sensitivity to management activities. For planning purposes, channel types were grouped into nine broad categories or stream process groups (Table 3-151).

Mapped Streams

All 42,429 miles of mapped streams on the Tongass National Forest have been classified by channel type. Unmappable streams are those which are typically very small. They may range from high gradient source to low gradient rearing streams, but contain some valuable aquatic habitat. A summary of the process groups present in the Forest is listed in Table 3-151. The lengths shown for each process group are in miles.

TABLE 3-151
STREAM CLASSIFICATION AND STREAM LENGTH BY PROCESS GROUP

Stream Process Groups	Channel Type Classification	Miles
Low Gradient Floodplain	B1, C1, C3, C4 C6, D4, D5, D8	9,956
Alluvial Fan	A3, B5, D1, D6	2,035
Mixed Control Moderate Gradient	B2, B3	4,726
Placid or Glide Streams	L1, L2,	1,265
Lakes and ponds	L, L3, L4, L5	528
Estuarine	E1, E2, E3, E4, E5	678
Large Low Gradient Contained	C2, C5	714
Moderate Gradient Contained	B4, B6, B7	2,652
High Gradient Contained	A1, A2, A4, A5, A6, D2, D7	24,609

PROCESS GROUPS
Channel Types

The following is a discussion of each process group, a listing of the channel types in each group, and the management implications.

Low Gradient Floodplain Stream Channels - These are channels (designated as B1, C1, C3, C4, C6, D4, D5 and D8 channel types) are composed of stream deposited fine sediments, small boulders, and cobbles and are characterized by active floodplain development. Channel gradient is usually less than two percent.

Floodplain riparian areas include the channel banks, active channel floodplains, sloughs, backwater overflow channels, and ponded swales and may extend well beyond 100 feet of the streambank. Floodplain streams are likely to overflow their banks during individual and seasonal storms, and during high water, making their riparian areas extremely dynamic. Flood energy is dissipated by these alluvial channels. The interaction of these streams with their adjacent landforms, including bank erosion, channel migration and overflow, leaf fall, and

blowdown/tree fall cause the channels contain a rich, abundant community of aquatic life.

Root networks of trees and shrubs are often the only physical structures holding streambanks of unconsolidated sand, gravel and organic materials together. Streambanks are often unstable, and channel migration and braiding commonly occur. Large woody debris (LWD) by regulating the stream's energy dissipation, plays an important role in controlling streambed and bank stability. Riffles formed when the stream velocity slows form good fish habitat.

Alluvial Fans Stream Channels - These channels (designated as A3, B5, D1, and D6 channel types) are transitional streams that both transport and deposit sediment. When the stream makes the transition from mountain slopes to low gradient floodplains, stream velocity slows, and cobbles and coarse gravel are deposited.

Alluvial fan stream channels frequently change course, generally after flash floods or debris torrents, when high volumes of sediment are quickly deposited on the streambeds, streambanks, and areas adjacent to streams. Water flow in these often unstable channels may be intermittent during the summer and winter months. Because of the complex stream network created, riparian areas for alluvial fan channels may be extensive.

Placid or Glide Streams - These channels (designated as L1 and L2 channel types) occur throughout watersheds on gently sloping, lowland landforms and are frequently associated with bogs, marshes, or lakes. Most of the sediment being transported is sand-sized or smaller, which settles out in these gentle gradient channels. Stream channels are fairly stable and contain their flows fairly well. Dense root systems formed by sedges, sphagnum mosses, and bank trees control channel stability. Flood waters often flow over adjacent landforms, an action which may lessen downstream flooding, and may serve as a buffer during major storms. Low gradient, slow flowing streams, such as those in placid or glide channels, are often associated with temperature-sensitive watersheds. Channel productivity is moderately tied to the riparian/terrestrial interaction. Although they are highly variable, riparian areas associated with these streams may be located within very large wetlands areas.

Lakes and Ponds - (designated as L, L3, L4, and L5 channels types). Lakes and ponds are water habitats situated in topographic depressions, dammed river channels or floodplain terraces of large glacial rivers; their surface size and depth dependent on the landform they occupy. This channel group includes all lakes, beaver ponds, and other ponds greater than 2 acres in size. (Isolated muskeg potholes or ponds less than 2 acres were not mapped.) Lakes contain valuable aquatic habitat for some fish species, primarily sockeye and coho salmon, and trout. Riparian vegetation includes muskeg sedges, rushes, and grasses or coniferous forest with shrub and herb understory.

Estuarine Stream Channels - These channels (designated as E1, E2, E3, E4 and E5 channel types) occur at the watershed mouths with estuarine landforms. (Estuarine landforms are defined as major stream deltas at heads of bays or along inlets.) They include all intertidal streams and streams that are inundated during high tides. Stream stage fluctuations, channel structure, sediment transport, and water chemistry are all influenced by saltwater inundation. These single or multi-channeled streams are often associated with saltwater marshes, meadows, mudflats, and gravel deltas. Channel bank materials are often small,

loose, fine textured water-deposited materials which are easily eroded. Stream containment varies from poor to fair. Much of the sediment produced from any given watershed is ultimately deposited in the estuarine channels, causing bank widths and depths to be highly variable and banks and channel beds to be highly unstable. These channels are highly sensitive to upstream management activity. Sedge and marshland plants dominate the streamside.

Mixed Control, Moderate Gradient Stream Channels - As the name implies, these channels (designated as B2 and B3 channel types) are a mixture of stream channel containment. Streambank materials may be boulders, cobbles or bedrock. Bedrock or valley walls control some stream segments, while other areas develop narrow floodplains. When an increased volume of water is introduced into these streams, they do not overflow. Bedrock channel segments act as sediment transport systems; sediment is deposited in the lower gradient (flatter) and floodplain segments. Streamflow velocity is regulated by large woody debris. LWD strongly influences channel form, sediment transport and fish habitat in these channels. It also forms water energy dissapators such as log step pools and lateral scour pools.

Large Low Gradient, Contained Channels - (designated as C2 and C5 channel types) Stream channels are contained by adjacent landforms, but the channel has little effect on those landforms. The stream influence zone often extends to the slope break above the cut valley slope and is influenced by upland soils and vegetation. Adjacent vegetation plays a major role in controlling the rate of downslope soil movement and amount of large woody debris (LWD). LWD accumulations dissipate stream energy (slow its velocity) and trap and store sediment that is being transported downstream.

Moderate Gradient, Contained Channels - These channels (designated as B4, B6 and B7 channel types) and streamflows are completely contained by adjacent landforms. Although they transport and deposit sediment downstream very efficiently, sediment deposition in the stream channels themselves is very limited. The stream influence zone is often dependent on streambank slopes. Narrow zones of influence occur where slopes are short, of low gradient, or do not exist; zones are more extensive where sideslopes are very large or steep.

High Gradient Contained Channels - These channels (designated as A1, A2, A3, A4, A5, A6, A7, B7, D2, and D7 channel types) are sources for downstream waters and transport organic and inorganic sediments to the downstream habitats. Their stream channels are well contained within the narrow valley bottoms. Channel banks are steep and generally composed of large material, either consolidated bedrock or well-packed boulders and cobbles. The riparian vegetation when present along these streams is in narrow (less than 20 foot) strips of alder, salmonberry, devil's club, or currant/brush communities. Channels are influenced predominantly by upland or terrestrial plant communities. Upper steep banks may be a mosaic of dense conifer and shrub plant communities. Leaves, forest litter, and trees often move downslope into these incised channels when disturbance occurs. Upland soils are often shallow and also subject to downslope movement.

WATER QUALITY

Changes in any of one of the physical and chemical properties of water can directly affect water use by people or other lifeforms. The most important characteristics for Forest water management are temperature, sediment, and chemical properties, especially dissolved oxygen and introduction of foreign chemicals. These water quality characteristics are discussed below.

Sediment

Water-transported earth materials are called sediments. Sediments in streams may be transported as either suspended or bedload sediment. Suspended sediment is carried within the water column, while bedload material moves (rolls or bounces) along the bottom of the stream or riverbed. Suspended sediment causes water to appear murky or turbid. Under natural conditions both suspended and bedload sediments occur during storm runoff events. The rate of sediment transport depends on discharge velocity and availability of materials.

Stream sediment originates from both geologic processes and human activities. Soil mass movements (landslides) and active developing stream systems are the main natural processes creating sediment. Steep terrain and large amounts of rainfall make the land sensitive to natural sediment production such as stream and river channel erosion, and to sediment produced by road construction and timber harvesting activities. Factors limiting or decreasing sediment include coarse textured soils with thick organic surface layers, high soil permeability and infiltration, and conditions that favor rapid revegetation of disturbed soil. Overland flow is limited to areas where the mineral soil is exposed, saturated depressions, or in barely definable ephemeral channels.

In Southeast Alaska suspended sediment loads of non-glacial streams in undisturbed watersheds are extremely low. Concentrations of suspended sediments normally are less than 10 parts per million (ppm) in winter, four to 30 ppm in summer, and occasionally over 100 ppm in the fall during storm runoff. These low levels are attributed to the dense vegetative ground cover.

Suspended sediment loads are low even in heavily logged watersheds. In two watersheds near Hollis, where clearcuts exceeded 2,000 acres in size, suspended sediments in the Harris River during and following logging never exceeded 3.7 ppm under average flow conditions or 148 ppm during peak flows. In the Maybeso watershed, suspended sediments never exceeded 7 ppm during average flow or 38 ppm during peak flows.

Suspended sediment in glacial streams is highly dependent on the volume of water flow from snow and ice melt. Midrange flows may contain 20-100 ppm, at high flow, concentrations may reach from 200 to more than 600 parts per million (ppm). Because the amount of glacial melt water is lowest between November and April, suspended sediment concentrations during these months April seldom exceed 20 ppm.

Water Temperature

Stream temperature is a principal regulator of biological activities in the aquatic environment. Fish, and most other aquatic organisms, assume the temperature of the water in which they live. Their metabolic activity is controlled by water temperature. This activity proceeds most efficiently within a limited temperature range. The State of Alaska Water Quality Standards describe the upper limits as 15°C (58°F) for fish migration, 13°C (56°F) for spawning, egg, and fry stages, and 15°C for rearing (18 AAC 70.020, 1973).

Small streams' principal heat source is solar energy directly striking the stream surface. Most Southeast Alaska streams are not highly sensitive to temperature changes. Frequent cloudiness, low air temperatures, steep channel gradients, and frequent precipitation generally keep stream temperatures below the range considered harmful to fish. Summer temperatures in main channel streams normally range from 6° C (37° F) to 11° C (52° F) but may occasionally exceed 15° C (60° F); winter temperatures typically range from 0°C (32° F) to 6° C (37° F).

Even though streams in Southeast are generally not highly sensitive to temperature changes, each stream's sensitivity is dependent on its own characteristics. These characteristics include discharge or streamflow, stream surface area, and the streambed characteristics. In addition, streamside vegetation, water source and aspect are involved in a stream's sensitivity to temperature changes. Streams are considered temperature-sensitive when one or more of the above characteristics changes allowing the temperature to exceed State Water Quality Standards for an extended period sufficient to affect fish production. Characteristics of potentially temperature-sensitive streams in Southeast Alaska include: runoff sources are extensive areas of muskegs or lakes, the stream aspect is southerly, channels are shallow and wide with sluggish or intermittent flows, or channels have extensive beaver ponds.

Water Chemistry

Dissolved oxygen is typically at or near saturation in streams due to their self-aeration characteristics. In many lakes and in streams which have smooth, low flows, oxygen concentrations may drop below saturation. Such decreases in dissolved oxygen saturation usually occur in summer dry periods with higher water temperature, when natural biotic demand for dissolved oxygen is at its peak.

Water is a solvent and a mechanical erosive agent. It contains many dissolved minerals as well as undissolved sediments in suspension. Although water in Southeast Alaska is never completely free of organic and inorganic matter, chemical water quality is high. Total dissolved solids concentrations are typically less than 150 ppm. Water samples, important for resource management on the Forest, are compared with water quality standards established by the State of Alaska in Table 3-152. Tongass National Forest measurements are within the State of Alaska Water Quality Standards.

In the past, introduction of foreign chemicals such as fertilizers, herbicides and accidents involving commercial transportation of toxic substances and petroleum products into surface waters of the Forest has been very low. The main potential is petroleum products from logging operations.

The State of Alaska regulates water quality requirements as stipulated by the Clean Water Act of 1977, as amended (PL 92-500). Maintaining water quality is an important aspect of Forest land management. Meeting State Water Quality Standards through prevention of nonpoint water pollution is accomplished through a management procedure or group of procedures called Best Management Practices (BMP's). BMP's are methods, measures, policies, or practices applied during forest management activities (such as road building, campground development) to prevent or reduce water pollution. The key to water quality protection is assuring that the right methods, measures or practices are in place to make certain that an action prevents or reduces water pollution. Usually BMP's are applied as a system of practices and are selected on the basis of site-specific conditions that reflect natural background conditions and political, social, economic, and technical feasibility. BMP's at this time are the most effective, practical means of preventing or reducing pollutants from nonpoint sources in order to achieve water quality goals. BMP's for the Forest are presented in the Regional Soil and Water Conservation Handbook (FSH 2509.22), Chapter 10 (Water Quality Management for National Forest System lands in Alaska).

TABLE 3-152
COMPARISON OF TONGASS NATIONAL FOREST STREAM WATER QUALITY MEASURMENTS AND ALASKA STATE WATER QUALITY STANDARDS

Parameter	No. of Samples	Mean Value	Maximum Value	Minimum Value	Alaska State Quality Water Standard
	Samples	Value	Maximum	Minimum	
Temp $^{\circ}$C	192	13.7	-------	-------	1/
Dissolved Oxygen (ppm)	74	11.5	12.8	10.4	2/
Conductivity (ohms)	239	43.9	69.6	25.6	3/
Turbidity	140	1.3	3.0	0.75	4/
pH	212	6.8	7.5	6.1	5/

Source: Region 10 Water Quality Data, compiled by Regional Hydrologist, 1987.

Alaska Water Quality Standards

1/ Water temperatures shall not exceed 15 $^{\circ}$C for fish migration; 13 $^{\circ}$C for spawning, egg, and fry stages, and 15 $^{\circ}$C for rearing.

2/ Dissolved oxygen content will not be less than 7 ppm for fish and in no case greater than 17 ppm or 110 percent of saturation. Dissolved oxygen shall not be less than 5 ppm and in no case less than 5 ppm to a depth of 20 centimeters in the interstitial waters over gravel used by anadromous or resident fish for spawning.

3/ N/A.

4/ Turbidity shall not exceed 5 JTUs (Jackson Turbidity Units) over natural conditions.

5/ pH shall not be less than 6.5 nor greater than 8.5 and shall not vary more than .5 unit from natural.

Floodplains

Executive Order 11988 directs Federal agencies to provide leadership and take action on Federal lands to avoid to the extent possible the long- and short-term adverse impacts associated with the occupancy and modification of floodplains. In addition, agencies are required to (1) avoid the direct or indirect support of floodplain development whenever there are practicable alternatives, (2) evaluate the potential effects of any proposed action on floodplains, (3) ensure planning programs and budgets requests reflect consideration of flood hazards and floodplain management, and (4) prescribe procedures to implement the policies and requirements of the Order.

Floodplains are usually built of sediments carried by the stream or river and deposited in slack water channel sections during high water periods. Floodplains are considered as areas subject to a one percent or greater chance of flooding in any given year (100-year recurrence). Nutrient-rich sediments underlain by coarse textures make floodplains the most productive lowland timber, wildlife, and fisheries resources sites on the Forest.

The floodplains on the Tongass are typically found in broad, flat alluvial U-shaped valleys and are forested and dominantly support plant communities having an overstory of Sitka spruce or Sitka spruce and western hemlock. The shrub understory is variable and includes blueberry, skunk cabbage, devil's club, salmonberry, alders and various mixtures of these. The herb understory is dominated by ferns and broadleaf plants of varying species. Supporting this vegetation are well, moderately well, or somewhat poorly drained, deep mineral soils with thin organic surface layers. Floodplains are designated B1, B8, C1, C3, C4, C5, C6, D4, and D5 channel types (see heading titled Stream Classification in this section for channel type description). These types of

floodplains are associated with 21 percent of the linear miles of the streams mapped on the Forest.

Flooding may occur over a broad diversity of land types including steep, narrow mountain canyons, wide, flat alluvial valleys, lake shores, coastal areas and alluvial fans. The predominant potential flooding sites on the Tongass National Forest are restricted to the varying width floodplains and terraces of the valley bottoms of U-shaped valleys. To date, no area-wide flood hazard or flood insurance studies have been conducted on the Forest. Soils and landform inventory data are the only available information for making initial determinations of the location and approximate boundaries of floodplain areas.

Wetlands

Executive Order 11990, as amended (42 U.S.C. 4321 et.seq.), requires Federal agencies that exercise statutory authority and leadership over Federal lands to avoid to the extent possible the long- and short-term adverse impacts associated with the destruction or modification of wetlands. Where practicable, direct or indirect support of new construction in wetlands must be avoided. Federal agencies are required to preserve and enhance the natural and beneficial values of wetlands in carrying out their responsibility for (1) acquiring, managing, and disposing of lands and facilities; (2) providing federally undertaken, financed, or assisted construction and improvements; and (3) conducting federal activities and programs affecting land use.

The Corps of Engineers (Federal Register 1982) and the Environmental Protection Agency (Federal Register 1980) jointly define wetlands as: "those areas that are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetative typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas."

The Corps of Engineers Wetlands Delineation Manual (Army Corps of Engineers 1987) provides the standards for determining areas of wetlands and deepwater habitats. In addition, DeMeo and Loggy (1989, Forest Service Paper, Unpublished) have classified wetlands on the Tongass National Forest. Land areas were defined as wetlands where soil, hydrology, and vegetation all met the following general diagnostic environmental characteristics.

1. Vegetation - The prevalent vegetation consisted of macrophytes (plants that can be readily observed without the aid of optical magnification) that are typically adapted to areas having hydrologic and soils condition described below. Hydrophytic species, due to morphological, physiological, and/or reproductive adaptation(s), have the ability to grow, effectively compete, reproduce, and/or persist in soils where oxygen is at least periodically deficient due to excessive water content.
2. Soils - Soils are present and have been classified as hydric, indicating that they are saturated, flooded or ponded long enough during the growing season to develop anaerobic conditions (conditions without oxygen) in the upper part of the soil.
3. Hydrology - The area is inundated either permanently or periodically at mean water depths less than or equal to 6.6 feet, or the soil is saturated to the surface at some time during the prevalent's vegetation growing season.

Streams and lakes on the Forest were defined as deep water habitats when any one of the three parameters of soil, hydrology, and vegetation met the following general diagnostic environmental characteristics.

1. Vegetation - No rooted-emergent (vegetation that remains standing at least until the beginning of the next growing season such as cattails and bullrushes) or woody plant species are present in these permanently inundated areas.
2. Soils - The substrate technically is not defined as a soil if the mean water depth is greater than 6.6 feet or if it will not support rooted emergent or woody plants.
3. Hydrology - The area is permanently inundated at mean water depths greater than 6.6 feet.

Wetlands and deep water habitats, once identified, were classified using the system developed for the U.S. Fish and Wildlife Service (FWS), U.S. Department of Interior by Cowardin et al. (1979). Wetland habitat types title have been expanded with coined words to better define wetland habitat types by local terminology.

Wetland functions include flood flow moderation, groundwater recharge and discharge, wildlife and fish habitat, and water quality protection. On the Forest, wetlands are made up of forested sites on both poorly and very poorly drained organic and poorly and somewhat poorly drained mineral soils. Open sites of herbaceous plants are found on poorly and very poorly drained organic soils (muskegs). Wetlands range from sea level to alpine and may also include estuaries, which are discussed under the Floodplains section in this section. Acres of wetland by Geozones are listed in Appendix L. Wetland systems and classes and total acres of each system and class on the Forest are listed in Table 3-153. Wetland classes and habitat types for these systems have been identified and classified (DeMeo and Loggy, 1988) and can be reviewed. These systems and classes are described below.

WETLAND SYSTEM DESCRIPTIONS

PALUSTRINE SYSTEM

The Palustrine wetland systems are the vegetated wetlands traditionally referred to as marshes, swamps, bogs, fens, and prairies. They include all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands that occur in tidal areas where salinity due to ocean-derived salts is below 0.5 percent. Palustrine wetland system classes include moss-lichen and emergent wetlands (muskegs), scrub-shrub wetlands and forested wetlands. These classes are described in the following paragraphs.

TABLE 3-153
ACRES OR MILES BY WETLAND SYSTEMS AND CLASS

Wetland Systems	Wetland Classes	Acres 1/	Miles
Palustrine			
	Muskeg	1,289,290	
	Forested	1,266,636	
	Scrub-shrub	142,483	
Estuarine		18,483	
Riverine			47,163
Lacustrine		268,000	
Total Wetlands		2,966,409	47,163

Source: Forest's Geographic Information System (GIS). Compiled from soil and channel typing inventory data.
1/ Represents the acres of wetlands that have been mapped in wilderness and non-wilderness areas on the Forest.

Muskeg Class

Muskegs are the most unique and distinct of the palustrine wetlands, comprising 44 percent on the Forest. The term "muskeg" according to Hanson (1962) denotes a bog in the northern part of North America characterized by an abundance usually of sphagnum moss and greater or lesser abundance of shrubs and low trees such as black spruce. In Southeast Alaska, all relatively open bogs with groundcover high in sphagnum mosses and/or sedges are called "muskegs."

Muskegs of Southeast Alaska vary in depth, composition, and vegetative relations. They have very poorly drained organic soils that depending on their soil type range from less than two feet to over 40 feet. Depending on the muskeg type, the soils material may consist of decomposed remains of sphagnum moss, sedges, shrubs, and forbs with some component of wood. Vegetation growing on muskegs relates to the organic material present, which in turn is related to the near-surface water table and its movements. Muskegs may be associated with lakes or streams. Streams associated with muskegs ecosystems, generally will have single, low gradient, confined channel types. Only one muskeg type is typically associated with lakes or ponds, this muskeg ecosystem is, in many cases, floating on top of part of the pond or lake as the muskeg encroaches on the pond or lake, slowly filling it in.

Forested Class

Forested wetland areas comprise 42 percent of the total mapped wetland acres. Depending on the soil type, the drainage in these wetland areas ranges from poor to somewhat poor. Vegetation ranges from scrubby mixed conifer forests (greater than 20 feet high) on the poorly drained sites to medium productive stands of mixed conifers, western hemlock, mountain hemlock or a mixture of western and mountain hemlock trees on these somewhat poorly drained sites. Understory vegetation is dominated by shrubs and forbs. Like muskegs, these forested wetlands may be associated with either streams or lakes, but for the most part, their aquatic ecosystems are their near-surface water tables. Forested wetlands can be found adjacent to all stream channel classes, but, for the most part, are associated with well contained stream channels. Streams, therefore, have little effect on them.

Scrub-Shrub Class

Scrub-shrub wetlands areas are the most vegetatively varied wetland classes in Southeast Alaska, they comprise five percent of the total mapped wetland acres. Soil drainage on these wetland areas, depending on soil type, ranges from very poor to poor. They are dominated by woody vegetation less than 20 feet tall depending on the plant association. Plant species may include true shrubs, young trees, and tree and/or shrubs that are small or stunted because of environmental conditions. Scrub-Shrub wetlands are associated with three broad wetland plant communities named scrub-shrub alder/willow, scrub-shrub evergreen/muskeg and forested scrub-shrub evergreen/muskeg. These wetlands may be associated with streams and lakes, but for the most part, their aquatic ecosystems are their near-surface watertables. They may be found adjacent to all stream channel classes. Well-contained streams adjacent to these wetlands have little effect on them.

ESTUARINE SYSTEM

The U.S. Fish and Wildlife Service's (1979) Wetland Classification System defines the Estuarine System as "deepwater tidal habitat and adjacent tidal wetlands that are usually semienclosed by land but have open, partly obstructed, or sporadic access to the open ocean, and which ocean water is at least occasionally diluted by freshwater runoff from the land."

Estuarine areas on the Forest are those areas that are predominantly intertidal and are those parts of the rivers or streams or other bodies of water having unimpaired connection with the open sea, where the sea-water is diluted with freshwater derived from land drainage. Since the National Forest System charter manages the land the Forest's wetland inventory data does not cover the areas below mean high, high tide.

Estuarine wetlands comprise only about one percent of the Forest's mapped wetland acres; the Forest's estuary wetlands are always associated with streams. The mineral soils of these wetlands have been water-deposited by those streams. Soil drainage ranges from very poor to somewhat poor. Vegetation reflects not only soil drainage, but the effects of being covered by high tide. Estuaries that support red fescue grass, bluejount grass, many-flowered sedge and forbs are rarely covered during high tides and have moderately poor to somewhat poor soil drainage. Others supporting Lyngbyei's sedge, silverweed, hairgrass, red fescue, yarrow, or long-awned sedge and bluejoint are covered daily with high tides and have poorly drained soils.

Estuary streams may be either single or multiple channeled. These channels are low gradient (not steep) and shallowly incised. Most of these channels are comprised of fine silt or sands, but they may also possess bedrock, boulders, cobbles and coarse gravel. Although estuary streams are rated as being well confined and having excellent containment, they may overflow their banks during periods of flooding at low tide.

RIVERINE SYSTEM

Riverine systems include all wetlands and deepwater habitats contained within channels, this class includes all the perennial streams and rivers on the Forest and constitutes 47,163 miles of wetlands and deepwater habitats. These areas are bounded on the landward side by an upland, by the channel bank, or by wetland dominated by trees, shrubs, persistent emergents, emergent mosses or lichens. In braided streams, the system is bounded by the banks forming the outer limits of the depression within which the braiding occurs.

LACUSTRINE SYSTEM

The Lacustrine system includes all lakes on the Forest, permanently flooded ones, reservoirs, and tidal lakes with ocean-derived salinities below 0.5 percent. Lacustrine wetlands systems include nine percent of the total mapped wetland acres.

Water Use

Key water uses on the Forest include domestic water supply, recreation, growth and propagation of fish, and hydroelectricity. These uses vary with location. The Forest supplies the domestic water supply to 18 permanent communities with three of them (Ketchikan, Sitka and Petersburg) having established municipal watersheds. In addition, water from the Forest is supplied to nine fish hatcheries, three industrial sites, nine logging camps, and three resorts.

Hydropower continues to be used in many places throughout the Forest to provide electricity for mining, sawmills, pulpmills, homes, and other uses. Six major power installations exist on the Forest. These installations are the Snettisham (south of Juneau), Beaver Falls, Ketchikan Lakes and Swain Lake (east of Ketchikan), and Blue and Green Lakes (north and east of Sitka). Additional installations and interties between installations are proposed. (See Lands Section).

SUPPLY/INVENTORY

Potential

Except during an occasional year when a drought condition may occur during late summer and early fall, increase in water yield presently in not a concern in Southeast Alaska as there are generally abundant flows throughout the year. On-Forest, projected water demand is not expected to exceed supply well beyond this planning period. Off-Forest, little of the total water has been legally claimed. It is unlikely that claimed water rights will ever exceed the actual supply except near some municipalities or large-scale mining operations.

Although such methods are not well documented in Alaska, timber harvest is one means of increasing water yield. An analysis of Staney Creek by Bartos (1978), showed that low to mean flows increased, but were detectable only after timber harvest had occurred on 30-35 percent of the watershed. It could be surmised that watersheds with the same characteristics would react similarly; however, yield increases between watersheds can be expected to vary depending on each watershed's characteristics. Similar analyses have not been conducted on the northern half of Forest. Even though Staney Creek analysis indicated that the low to mean flows were tending to return to pre-harvest flow, levels long-term flow measurements must be conducted to determine the long-term off-site increase or decrease in flow due to dense second growth.

The potential for increasing the usable water supply at points of principal community or hydroelectrical demand is by increasing storage through the use of reservoirs. Reservoirs allow runoff to be delayed until the greatest water demand exists. If new dams are constructed on the Forest, there is a potential for increased water storage.

DEMAND ASSESSMENT

Water demand from the Forest's rivers and streams, is that water be maintained under natural conditions for its beneficial uses. These needs have led to more attention and management emphases being placed on aquatic/riparian fish and wildlife management. The need to better manage the aquatic aspect led to stream channel inventories being conducted to identify, classify and map the different stream and river characteristics on the Forest. Demand for water for fisheries and recreation will increase.

EXISTING DIRECTION

In general, national policy directs management of the water resource on the National Forest in accordance with objectives of multiple-use and the specific objectives in the Land and Resources Management Plan for the area involved. The Regional and Forest Guides, and the Southeast Alaska Area Guide contain the policies, objectives and direction for the Tongass Land Management Plan (TLMP) to meet national policy.

In summary, the Tongass Land Management Plan's objectives for water resource management are to maintain water quality in accordance to beneficial use needs and all applicable legislation. This objective also includes restoring the chemical, physical and biological conditions of degraded waters to an extent consistent with the goal of respective land management plans and State Water Quality standards.

The Southeast Alaska Area Guide Policies describe the specific direction to accomplish the above objectives. These policies, in essence, give direction to the Forest for the use of site-specific prescriptions to protect water quality for certain land management activities: long-term monitoring on representative watersheds to access land management impacts on water quality, and cooperation with the State in identifying and monitoring new non-point pollution sources and enforcing water quality standards.

RESULTS OF TLMP IMPLEMENTATION

Increases in stream sedimentation, based on the information available when TLMP was written and then implemented, were expected primarily from the 295 miles of new roads that would have been required each year to harvest timber. The primary impact to water was expected to be a temporary change in water quality from sedimentation during and shortly after road construction (TLMP FEIS 1979). Due to depressed timber markets between 1982-86, less timber harvested, and therefore, less road construction activity than had been projected by TLMP. TLMP projected construction of 198 miles of permanent and temporary road annually, but 144 miles annually were built between 1980 and 1988. With the application and enactment of Regional policies and guides, the effect should have been less than was anticipated in TLMP.

Management accomplishments for scheduled management activities in water generally lagged behind for some established goals. Water resource improvements by 1984 were 10 percent of those scheduled. Although a high number of improvement projects had originally been identified, a lack of specific information on their necessity and proposed implementation caused their deferral. Only 40 percent of proposed water resource monitoring activities scheduled were completed by 1984. Table 3-154 summarizes the accomplishment of scheduled water resource improvement activities.

Cooperation with the State for water quality protection was accomplished through a Memorandum of Understanding between the Forest and the Alaska Department of Environmental Conservation. Water monitoring for short-term (3-5 years) management activities was started but then suspended due to the lack of funds. Long-term water monitoring stations collecting stream flow and temperature have continued on representative watersheds through contracts with the U.S. Geological Survey. Table 3-155 summarizes the accomplishment of scheduled water resource monitoring activities.

TABLE 3-154
WATER RESOURCE IMPROVEMENT ACTIVITIES BY ADMINISTRATIVE AREAS (1979-1988)

	Chatham Area	Ketchikan Area	Stikine Area	Total
Number Scheduled (1979)	1	0	90	91
Number Subsequent Scheduled (1984)	0	0	5	5
Number Accomplished (1989)	1	-	5	6
Percent Accomplished	100	-	100	100

TABLE 3-155
WATER RESOURCE MONITORING ACTIVITIES BY ADMINISTRATIVE AREAS (1979-1988)

	Chatham Area	Ketchikan Area	Stikine Area	Total
Number Scheduled (1979)	1	0	0	1
Number Subseq. Scheduled (1984)	2	0	2	4
Number Accomplished (1988)	2	-	2	4
Percent Accomplished	100	-	100	100

OPPORTUNITIES AND CONCERNS

From a management perspective, water resource concerns revolve around utilization of the productive capabilities of the upland areas while still minimizing potential adverse impacts to water quality. The particular resource concerns are about the potential impacts from other management activities on the water quality so that the beneficial water use needs can be maintained or enhanced. With increased demand fish habitat protection and continued use and needs of other resources commodities (such as timber), conflicts will intensify and become more difficult to resolve.

WILD, SCENIC AND RECREATION RIVERS

OVERVIEW

The Alaska Lands Act of 1980 (ANILCA) designated 26 rivers in Alaska as components of the National Wild and Scenic River System under the Wild and Scenic Rivers Act of 1968. None of these rivers is within the Tongass National Forest. An additional 12 rivers were designated as "study rivers" by ANILCA, of which only one, the Situk River near the community of Yakutat, is within the Tongass National Forest. The Situk River, including the West Fork and Old Situk Creek, was studied in 1983 and found eligible, but was not recommended for designation. The National Rivers Inventory maintained by the Department of Interior, National Park Service, does not contain any rivers on the Tongass National Forest. As a result, no rivers other than the Situk have been evaluated as to their potential eligibility for inclusion in the National system.

In respect to the Alaskan rivers designated by ANILCA as system components or study rivers, ANILCA provided direction that differed from the Wild and Scenic Rivers Act. ANILCA Section 606(a) provided for a wider corridor and mineral withdrawal area (640 acres per mile, or 1/2 mile either side of the river) for those rivers specified in the Act. Subsistence activities including the use of snowmobile, motorboats and other means of surface transportation traditionally employed for such purposes by local residents, subject to reasonable regulation, were also guaranteed under ANILCA.

There is no statewide rivers inventory for Alaska and no comprehensive inventory of river resources for the Tongass National Forest as they relate to their eligibility to be considered for inclusion in the National Wild and Scenic River System. The database for the Forest Plan revision contains extensive information on many aspects of the river resource, which could become the basis for a more comprehensive inventory of potential Wild and Scenic Rivers.

SUPPLY/INVENTORY

There are over 800 named river systems on the Tongass National Forest, containing some 42,000 miles of perennial stream. Some 12,000 miles of stream support anadromous fisheries. Some 83 streams and rivers have been identified by the Alaska Department of Fish and Game as "important" or "high quality" watersheds because of their commercial fish production, sport fishing value, or other wildlife and fish related attributes. Several of the major rivers rise in British Columbia or the Yukon Territory of Canada and are currently subject to international fishery management agreements. One river, the Alsek, is managed as part of the Canadian Heritage River program in Kluane National Park. A portion of this river is in Glacier Bay National Park managed by the U.S. Department of Interior, National Park Service. Some of the major rivers have historically been used as travelways into Canada, including steamboat travel, and are identified by the State as having potential as road corridors connecting Southeast Alaska with Canada. A number of rivers also have a record of prehistoric use for travel and subsistence activities. The State of Alaska claims jurisdiction over the water and bed of all "navigable" streams and rivers.

Only a small number of streams on the Tongass have been subject to the development of water and power projects, are paralleled by roads or influenced by timber harvest. To date, the small size of communities and (with a few exceptions) the lack of industrial development have meant that water supply and hydroelectric projects are small and widely scattered. There are no large "mainstem" dams in Southeast Alaska. This lack of development, along with generally high scenic quality, implies that many streams on the Tongass would be considered as possessing outstandingly remarkable values when compared to rivers

in the Lower 48. A number of streams and rivers are included within identified potential research natural areas, where unusual or unique geologic features, plant associations or wildlife habitat exists.

Only a few rivers have any road access, and fewer still have access to both upstream and downstream segments. Many have steep gradients or numerous barriers to travel in the form of fallen trees. As a result, recreation use typically considered important in defining outstanding recreation value, such as the opportunity to float or kayak the river, is found on only a few rivers or river-lake systems at the present time. Powerboat access is common on some rivers. Most public river use of rivers occurs near their mouths in bays and estuaries, where fishing, hunting and viewing scenery and wildlife are dominant activities.

RIVER DESCRIPTIONS

The nine rivers identified in scoping as potential Wild and Scenic Rivers are briefly described below:

Alsek River

The Alsek is a large continental river rising in the Yukon Territory of Canada, flowing down the east side of the St. Elias mountains through British Columbia and Glacier Bay National Park, then along the east boundary of the Yakutat Ranger District of the Tongass National Forest entering the Gulf of Alaska at Dry Bay. About 12 miles of the river is within the National Forest. The Alsek receives significant river rafting use originating mainly on a major tributary, the Tatshenshini, at Dalton Post, British Columbia. The Alsek has a long cultural history as a travelway and trade route for Native groups. The river is used heavily for subsistence fishing, and commercial fishing is governed by international agreement.

Taku River

The Taku is a large continental and glacial river rising near Atlin, British Columbia and flowing through the Coast Range into the sea about 30 miles east of Juneau. The Taku flows through the Tongass National Forest for about 14 miles before reaching saltwater near Twin Glacier. Due in part to its proximity to a major population center, the Taku receives significant recreation use primarily in its lower reaches and estuary. It is a major producer of salmon and commercial fishing is governed by international agreement between the United States and Canada. The Taku has also been used as a travel route for Native and other groups. Because it provides a corridor through the Coast Range, it is important for the movement of wildlife and plant species.

Whiting River

The Whiting is a moderate size continental river rising in British Columbia and flowing through the Coast Range into the sea at Port Snettisham about 30 miles south of Juneau. The Whiting flows through the Tongass National Forest for about 22 miles. The section on the Forest flows through a wide valley with multiple braided channels. It receives significant recreation use in its lower reaches primarily for hunting and fishing.

Stikine River

The Stikine is probably the best known river in Southeast Alaska due to both its size and its historic use as a travel corridor. It rises in North Central British Columbia and flows through the Coast Range into the sea about 10 miles north of Wrangell, which at various times was the point of embarkation for steamboat travelers bound for Telegraph Creek and the Cassiar gold fields. The Stikine flows through the Tongass National Forest for about 20 miles before reaching a broad delta with numerous channels, islands and mudflats. In its lower reaches, the river has multiple channels which are several miles wide. The Stikine is a major salmon stream and commercial fishing is governed by

international agreement with Canada. The broad valley cut through the Coast Range exhibits significantly different climatic conditions than surrounding areas, resulting in numerous species of plants and wildlife not common to other areas of Southeast Alaska. The Stikine receives significant recreation use by boaters traveling both upstream with powerboats and floating or canoeing the river from as far upstream as Telegraph Creek (160 miles). There are numerous recreation developments including five Forest Service Recreation cabins and a developed hot springs.

Unuk River The Unuk rises in the Coast Range on the Alaska-Canada boundary in Misty Fiords National Monument about 100 miles northeast of Ketchikan. It flows through the Tongass National Forest for about 30 miles before entering the sea at Burroughs Bay. Access to this area is lengthy and difficult in part due to its remoteness from population centers.

Thorne River The Thorne is a moderate size river which rises on Honker Divide on North Prince of Wales Island and flows about 17 miles southeast into Thorne Bay, site of a permanent logging community with 500 residents. The Thorne is a popular steelhead fishery, and is frequently accessed by canoe for its entire length including a portage across Honker Divide and down Hatchery Creek to Sweetwater Lake near the community of Coffman Cove. It is one of only a few road accessible rivers on the Tongass. It is accessible from Thorne Bay and other communities on Prince of Wales Island.

Lisianski River The Lisianski is a small river about six miles in length on Chichagof Island which drains into Lisianski Inlet near the community of Pelican. It is within Alaska Pulp Corporation Long-term Sale Area, but no development activities have occurred to date. The river is an anadromous fish stream with scenery typical of many similar streams on Chichagof Island. The drainage, including Lisianski Inlet, is important locally for recreation and subsistence uses.

Kadashan River The Kadashan and its tributary Tonalite Creek comprise the major streams in the Kadashan drainage on Chichagof Island across Tenakee Inlet from the community of Tenakee Springs. Combined, these two streams total about 20 miles in length. A road was constructed about four miles up the Kadashan River as part of the Alaska Pulp Corporation Long-term sale but activity was discontinued due to local controversy over the effects of timber harvest on scenic quality, recreation, and subsistence use of the area. The Kadashan is an important anadromous fish stream. Its general character and scenic values are typical of many small to moderate streams on Chichagof Island.

Situk River The Situk is a moderate sized river which rises in Russell Fiord Wilderness at Situk Lake and flows about 16 miles south across the Yakutat Forelands into the Gulf of Alaska five miles west of the community of Yakutat. The Situk is a major salmon producing stream and is world famous for its steelhead fishing. It is also of major importance for subsistence fishing by residents of the mostly Native community of Yakutat. In 1980, through ANILCA, Congress designated the Situk as a 'study' river. The study was completed by the Forest Service in 1983. This study determined that the river, with its West Fork and Old Situk Creek tributaries, was eligible, but did not recommend designation. The Situk is predicted to become the primary outlet of Russell Fiord when and if the Hubbard Glacier, which is advancing, closes the outlet of the fiord. Based on studies by the U.S. Geological Survey, flows are predicted to exceed 50,000 cubic feet per second (cfs) and the river channel is likely to exceed five miles in width.

DEMAND ASSESSMENT

There has been a generally low level of public interest in additional Federal land designations in Southeast Alaska. Congress (Section 101 of ANILCA) states their intent was for no additional Conservation Units (which includes Wild and Scenic Rivers). Many people believe that such designation ultimately may result in regulation of traditional uses or eliminate future development potential important to Alaska. During public scoping, nine rivers were identified as potentially needing some form of "protection," but rarely mentioned the option of Wild and Scenic River designation. On the other hand, there is a strong issue relating to the protection of anadromous fish habitat, which is often expressed as opposition to development on or near streams. The nine publicly identified rivers include several major rivers, but also include some relatively small streams which are primarily of interest to nearby local communities as places residents use for recreation or subsistence activities. Only recently, organizations outside of Alaska have begun to express a desire for further study and evaluation of rivers. This relatively low level of public interest in designation is partly explained by the large number of undeveloped rivers available and that many are not subject to development under the Tongass Land Management Plan.

EXISTING DIRECTION

The Tongass Land Management Plan makes no reference to the Wild and Scenic Rivers System and did not evaluate any rivers for eligibility. A separate study was done for the Situk as directed by ANILCA. TLMP did provide standards and guidelines, and best management practices, for management of streams and adjacent lands when projects such as timber sales are implemented. An undetermined number of rivers and streams which may possess outstandingly remarkable values are included in Wilderness and in lands allocated to LUD 1 "released" and LUD 2, in which the wildland character is to be maintained. These areas total 8.2 million acres, and thus contain abundant stream and river resources on which no development is currently proposed.

The nine publicly identified rivers were allocated to LUD's as follows:

Unuk	LUD 1 Wilderness
Stikine	LUD 1 Wilderness
Alsek	LUD 2
Situk	LUD 2
Taku	LUD 2
Whiting	LUD 3
Thorne	LUD 3
Kadashan	LUD 3
Lisianski	LUD 4

RESULTS OF TLMP IMPLEMENTATION

Since TLMP did not establish management direction or standards and guidelines for Wild and Scenic Rivers, no attempt was made to analyze the effects of implementation in the Technical AMS.

OPPORTUNITIES AND CONCERNS

There are extensive opportunities on the Tongass to increase the number of components in the National Wild and Scenic River System. However, lacking a comprehensive inventory of potentially eligible rivers, determining which rivers have the most outstanding values, or which might contribute to representation of ecosystems or features within the National River System is difficult. Because the number of significant undeveloped rivers has been relatively small, in many states the Forest Service has evaluated rivers on a case-by-case basis, which in their cases has been workable. The Northwest Rivers Study for the Pacific Northwest states was a recent attempt to provide a more comprehensive analysis.

The large number of undeveloped rivers and streams on the Tongass presents the opportunity to use a comprehensive approach to evaluating potential components of the Wild and Scenic River System prior to the emergence of development proposals that might affect a river's eligibility. Conversely, because so few rivers are developed, or likely to be developed in the near future, use of a case-by-case approach, which focuses on rivers that have been identified by the public, appears appropriate.

Even without a comprehensive inventory, it is clear that rivers on the Tongass present a major opportunity to represent ecosystems or features not represented by existing components of the National Wild and Scenic River System. For example, just the nine rivers for which the Revision will determine eligibility include runs of anadromous fish that have not been significantly altered through management. Some contain the full diversity of anadromous fish species. Some present unique "fly-in, float out" recreation opportunities. Most are within a temperate rain forest ecosystem and present the only opportunity outside of Washington, Oregon and northern California to represent this ecosystem in the National System. Several represent active glacial systems not represented in the Lower 48. Some offer the opportunity to represent rivers that flow through the entire vertical range of ecosystems, from alpine tundra to the sea, in a relatively short distance.

WILDERNESS

Note: The following is a very brief summary of information on the existing wilderness areas on the Tongass. Please see Appendix M for an in-depth treatment.

OVERVIEW

On December 2, 1980, through the enactment of Public Law 96-487, the Alaska National Interest Lands Conservation Act (ANILCA), Congress designated 43 areas as wilderness totaling 56.4 million acres in Alaska as a part of the 91 million acre National Wilderness Preservation System. Included were 5.4 million acres in 14 Wildernesses established on the Tongass National Forest (see table 3-156). Two of the areas, Admiralty Island Wilderness and Misty Fiords Wilderness, were also designated as National Monuments. Prior to ANILCA there was no designated wilderness on the Tongass.

TABLE 3-156
WILDERNESS AREAS ON THE TONGASS NATIONAL FOREST

Name	Gross	Acres Non NFS	Net
Admiralty Island National Monument Wilderness	969,564	32,168	937,396
Coronation Island Wilderness	19,232	0	19,232
Endicott River Wilderness	98,729	0	98,729
Maurelle Islands Wilderness	4,937	0	4,937
Misty Fiords National Monument Wilderness	2,142,907	664	2,142,243
Petersburg Creek-Duncan Salt Chuck Wilderness	46,849	72	46,777
Russell Fiord Wilderness	348,701	0	348,701
South Baranof Wilderness	319,568	0	319,568
South Prince of Wales Wilderness	91,018	22	90,996
Stikine-LeConte Wilderness	449,951	1,025	448,926
Tebenkof Bay Wilderness	66,839	0	66,839
Tracy Arm-Fords Terror Wilderness	653,179	0	653,179
Warren Island Wilderness	11,181	0	11,181
West Chichagof-Yakobi Wilderness	265,529	782	264,747
TOTAL ACREAGE	5,488,184	34,733	5,453,451

Source: Acreages as reported to Congress with official boundary maps. These acreages may change over time as mining claims or State and Native land selections are patented. These wildernesses include only the public lands above mean high tide.

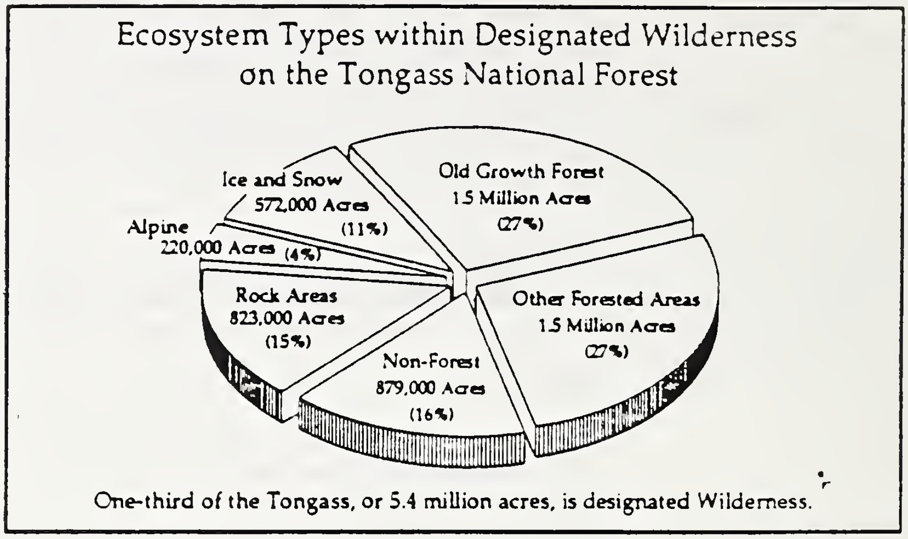
SUPPLY/INVENTORY

Within the 14 Tongass wilderness areas are found the various wildland ecosystems of Southeast Alaska, including 1.5 million acres of old growth forest (see Figure 3-62). The wildernesses are mostly in a pristine condition, with the imprint of man substantially unnoticeable. They offer outstanding opportunities for solitude and primitive recreation. Each Wilderness area is described and discussed in detail in Appendix M.

Monitoring has been minimal in most of the wilderness, but has shown some resource damage and user conflict in localized concentrated use areas, indicating a need for increased management presence and for public education on minimum impact camping techniques and appropriate use of wilderness. The very limited monitoring in some of the remote wildernesses, such as South Prince of Wales and Coronation Island Wildernesses, indicates very little use but some resource

damage and occupancy trespass. The areas with the greatest use and most management activities tend to have the greatest need for additional management direction to resolve user conflicts and preserve the wilderness resource.

FIGURE 3-62
WILDERNESS ECOSYSTEM TYPES



EXISTING DIRECTION

Wilderness Act

The National Wilderness Preservation Act of 1964 mandates that designated "wilderness areas"--- "shall be administered for the use and enjoyment of the American people in such a manner as will leave them unimpaired for future use and enjoyment as wilderness, and so as to provide for the protection of these areas, the preservation of their wilderness character, and for the gathering and dissemination of information regarding their use and enjoyment as wilderness".

Subject to existing private rights, the Act prohibits permanent roads and, except as necessary for realizing the recreation and other wilderness purposes of the area, commercial enterprises. Temporary roads, the use of motor vehicles, motorized equipment, other mechanized equipment, motorboats, the landing of aircraft, and structures and installations are prohibited except as necessary to meet minimum requirements for the administration of the area as wilderness. The Act provides that the use of aircraft or motorboats, where these uses have already become established, may be permitted to continue subject to restrictions by the Secretary of Agriculture. Wildernesses were withdrawn from mineral entry as of December 31, 1983, and patenting of valid claims is limited to subsurface mineral rights.

ANILCA

In ANILCA, Congress reaffirmed and expanded upon the purposes of wilderness as stated in the 1964 Wilderness Act, specifically for wilderness established in Alaska. In recognition of unique situations and established uses in Alaska, ANILCA also provided a number of important specific exceptions to the prohibitions of the Wilderness Act. Some of these follow.

Subsistence Policy	1. Section 811 mandates that the Secretary "shall ensure that rural residents engaged in subsistence uses shall have reasonable access to subsistence resources on public lands." This section further directs that, other laws (including the Wilderness Act) notwithstanding, the Secretary "shall permit on the public lands appropriate use for subsistence purposes of snowmobiles, motorboats, and other means of surface transportation traditionally employed for such purposes by local residents, subject to reasonable regulation."
Special Access	2. Section 1110(a) requires that the Secretary "shall permit" on Conservation Units, which includes Wilderness, "the use of snowmachines (during periods of adequate snow cover or frozen river conditions in the case of wild or scenic rivers), motorboats, airplanes, and nonmotorized surface transportation methods for traditional activities (where such activities are permitted by this Act or other law) and travel to and from villages and homesites." Such use is subject to reasonable regulation but shall not be prohibited unless after notice and hearing the Secretary finds that such use would be detrimental to the resource values of the area.
Inholding Access	3. Section 1110(b) assures adequate and feasible access to State and private land and to valid occupancies including valid mining claims.
Navigation Aids and other Facilities	4. Section 1310(a) provides that reasonable access to, and operation and maintenance of, existing air and water navigation aids, communication sites, facilities for national defense, and related facilities and existing facilities for weather, climate and fisheries research and monitoring shall be permitted. "Nothing in the Wilderness Act shall be deemed to prohibit such access, operation and maintenance within wilderness areas designated by this Act." Section 1310(b) provides that the establishment, operation and maintenance of new such facilities shall be permitted within wilderness after consultation with the Secretary and in accordance with mutually agreed upon terms and conditions to minimize the adverse effects within the Unit.
Aquaculture	5. Section 1315(b) provides that the Secretary may permit fishery research, management, enhancement, and rehabilitation activities within National Forest System Wilderness, in a manner which adequately assures protection, preservation, enhancement and rehabilitation of the wilderness resource. Subject to reasonable regulations, permanent improvements and facilities such as fishways, fish weirs, fish ladders, fish hatcheries, spawning channels, and stream clearance, egg planting and other accepted means of maintaining, enhancing, and rehabilitating fish stocks may be permitted.
Public Use Cabins	6. Section 1315(c) provides for the continued use, maintenance and replacement of existing Public Use Cabins within wilderness. Section 1315(d) authorizes the construction and maintenance of a limited number of new public use cabins and shelters, if necessary, for public health and safety, and also requires the Secretary to notify Congress of his intention to remove an existing or construct a new public use cabin or shelter.
Beach Log Salvage	7. Section 1315(f) allows the Secretary to permit or otherwise regulate the recovery and salvage of logs from the coastlines of National Forest wilderness and monuments.

Temporary Facilities for Hunting and Fishing

8. Section 1316(a) provides that the Secretary shall permit, subject to reasonable regulation to insure compatibility, the continuation of existing uses and future establishment and use of temporary campsites, tent platforms, shelters, and other temporary facilities and equipment directly and necessarily related to the taking of fish and game. Facilities and equipment shall be constructed, used and maintained in a manner consistent with the protection of the area where they are located. New facilities shall be constructed of materials which blend with and are compatible with the surrounding landscape. Section 1316(b) allows the Secretary to deny new facilities and equipment upon making a determination, after public notice, that the establishment and use of new facilities or equipment would constitute a significant expansion of existing facilities or uses which would be detrimental to the purposes for which the unit was established, including "wilderness character."

Wilderness Act Applies

In spite of its many exceptions to the Wilderness Act, ANILCA defines "wilderness" to have the same meaning as when used in the Wilderness Act ((Sec. 102(13)). Further, Sec.707 states that except as expressly provided in ANILCA, Alaskan wilderness "shall be administered in accordance with applicable provisions of the Wilderness Act governing areas designated by that Act as wilderness". Therefore, activities not discussed in ANILCA must be administered in accord with the Wilderness Act just the same as wilderness in other parts of the country.

OTHER DIRECTION

The Tongass Land Management Plan was completed prior to the enactment of ANILCA. TLMP was amended in 1985-86, but the amendment deferred specific management direction to individual wilderness management direction documents. Only five of these had been approved before an appeal of the Stikine-LeConte Wilderness Plan resulted in a decision by the Chief of the Forest Service that modified existing regional direction regarding the use of helicopters by the public (no longer allowed unless the use had been established prior to ANILCA), and the use of chainsaws and generators by cabin permittees (to be phased out) in wilderness. Management direction for the other nine Wilderness areas has not been completed at this time. (See Appendix W for additional management direction, and the existing wilderness management plans.)

Implementation of existing direction has varied greatly between the various wildernesses. Some areas, such as Admiralty and Misty Fiords Wildernesses, have had significant management programs and accomplishments, while others have had minimal management activities. Some of the management activities, such as fisheries enhancement projects and the authorization of temporary facilities for the taking of fish and wildlife, have resulted in administrative appeals by user groups who view these activities as conflicting with their use or with wilderness values.

CONCERNS AND OPPORTUNITIES

Public involvement in developing wilderness management direction and in the issue identification for the TLMP Revision has surfaced a number of concerns about how designated Wilderness in Alaska should be managed. Some members of the public feel that Tongass Wildernesses should be managed very similarly to the way other Wildernesses outside of Alaska are managed. Others feel strongly that Alaska is different and that ANILCA should be interpreted liberally, with Wilderness being managed to cause the least impact on traditional uses. It is within the area of

discretionary activities under ANILCA that policies determining how "purely" wilderness should be managed need to be refined or developed.

There is a need not only to complete management direction for nine wilderness areas, but also to revise the existing direction to conform with the Chief's decision on Stikine-LeConte, and to ensure consistent direction is applied to all 14 Tongass Wilderness areas. This direction should provide for expanded monitoring, increased patrols, and improved wilderness management, and emphasize wilderness ethics education.

The opportunity exists through the TLMP Revision process to establish a framework of consistent management direction, with standards and guidelines, for all 14 wildernesses. The standards and guidelines can be responsive to identified public issues and management concerns. Implementation schedules for each of the individual wildernesses can then be prepared to provide area-specific details for implementing the standards and guidelines.

WILDLIFE

OVERVIEW

The Tongass National Forest provides habitat for 54 species of mammals (this number includes the recently introduced elk on Etolin Island), 231 species of birds and five species of amphibians and reptiles (Taylor 1979). There are an additional 18 species of marine mammals found in Southeast Alaska which depend entirely on the ocean environment, 45 species of birds which are considered casual or accidental visitors to Southeast Alaska, and three species of amphibians and reptiles which are considered casual or accidental visitors to Southeast Alaska (Taylor 1979). These species provide many opportunities for consumptive and nonconsumptive use by the public, including commercial, sport, subsistence, and photographic and viewing activities. The Forest is rich in its varied and unique species. Some of the species found on the Forest in abundance are threatened or endangered in other parts of the United States. Table 3-157 summarizes the scientific orders of birds, mammals, reptiles, and amphibians occurring in Southeast Alaska.

MAMMALS

There is not a good understanding of the abundance and distribution of many of the species in the orders Insectivora, Chiroptera, Lagomorpha, and Rodentia. Current knowledge indicates that the species of hares and rabbits (in the order Lagomorpha) are only found on the mainland. Bat species in the order Chiroptera are probably distributed in suitable habitats throughout the islands. Species of Insectivora and Rodentia are found on various islands, but their total distribution and the methods and frequency of dispersal between islands are not totally understood.

Klein (1963) provides an excellent summary of the postglacial mammal distribution patterns in the southern coastal regions of Alaska. The distribution of small mammals in Southeast Alaska may be accounted for with 3 hypotheses (Klein 1963):

1) Refugia (areas that were not covered by glaciers during the last ice age) existed in some offshore areas now submerged at least during the Wisconsin glaciation, as well as land connections between islands or between islands and the mainland;
2) The affinities of some species of small mammals occurring on widely separated islands are the result of parallel morphological changes occurring under similar environmental stimuli in postglacial times;
3) Inter-island dispersal of some species of small mammals occurred via Indian canoe in recent times.

None of these hypotheses have been tested, and we are still in need of additional data and research on the distribution of small mammals in Southeast Alaska.

The 22 species in the orders Cetacea (whales, dolphin, and porpoises) and Pinnipedia (seals and sealions) are often referred to as marine mammals. Some of these species are entirely aquatic and never use land, while other species use land for a portion of their life requirements. Eight species of whales are listed as endangered under authority of the Endangered Species Act. Information on the endangered whale species is presented in the section on threatened and endangered species.

The order Carnivora includes such species as the gray wolf, black bear, brown bear, marten, ermine, river otter, sea otter, and lynx. Many of these species are valuable for their furs, food and nonconsumptive viewing. Because these animals have been hunted and trapped, more is known about their distribution and abundance.

TABLE 3-157
NUMBER OF SPECIES OCCURRING IN SOUTHEAST ALASKA BY SCIENTIFIC ORDER

BIRDS	Number of Regular Occurring Species 1/	Number of Occasional Occurring Species 1/	Number of Known/ Probable Breeders
Scientific Order:			
Gaviiformes (Loons)	4	0	2
Podicipediformes (Grebes)	4	0	0
Procellariiformes (Albatrosses, Fulmars, Petrels)	9	1	2
Pelecaniformes (Cormorants)	2	1	2
Ciconiiformes (Herons, Bitterns)	2	1	2
Anseriformes (Ducks, Geese, Swans)	36 2/	8	21
Falconiformes (Hawks, Eagles, Falcons)	12	0	8
Galliformes (Grouse, Ptarmigan)	5	1	5
Gruiformes (Cranes, Coots)	3	0	2
Charadriiformes (Shorebirds, Gulls, Alcids)	55	11	25
Columbiformes (Pigeons, Doves)	3	0	2
Strigiformes (Owls)	9	2	3
Caprimulgiformes (Nighthawk)	1	1	0
Apodiformes (Swifts, Hummingbirds)	4	0	3
Coraciiformes (Kingfisher)	1	0	1
Piciformes (Woodpeckers)	6	0	5
Passeriformes (Perching Birds)	75	19	64
MAMMALS			
Scientific Order:			
Insectivora (Shrews)	4	0	4
Chiroptera (Bats)	6	0	6
Lagomorpha (Hares, Pika)	2	0	2
Rodentia (Mice, Squirrels, Voles)	21	0	21
Cetacea (Whales, Dolphins, Porpoise)	17	1	?
Carnivora (Wolf, Weasel, Bear, Otter, etc.)	15	0	15
Pinnipedia (Seals, Sea Lions)	3	1	3
Artiodactyla (Deer, Moose, Mountain Goat, Elk)	4	0	4
AMPHIBIANS AND REPTILES			
Scientific Order:			
Caudata (Newt, Salamander)	2	1	2
Anura (Toads, Frogs)	3	0	3
Squamata (Snakes)	0	1	0
Chelonia (Turtles)	0	1	0

Source: Taylor 1979

1/ Number of regular occurring species represents those species which are considered rare, uncommon, or common, but occur annually in Southeast Alaska. Number of occasional occurring species represents species which do not occur annually in Southeast Alaska.

2/ The four subspecies of Canada geese are counted as separate species.

The order Artiodactyla includes three species (Sitka black-tailed deer, moose and mountain goat) which are native to Southeast Alaska, and one recently introduced species (elk). Only one small population of elk occurs on the Forest on Etolin Island; this is from a cooperative transplant effort between the Alaska Department of Fish and Game, sportsmens' groups, and the Forest Service. The elk population is very small, and its viability is not known. Sportsmens' groups are interested in transplanting additional elk. Information on the three native species is included later in this section in the discussions on Management Indicator Species.

BIRDS

Birds in the orders Gaviiformes, Podicipediformes, Procellariiformes, Pelecaniformes, and Charadriiformes are often collectively known as seabirds. Many of these species use the food resources of the ocean and freshwater lakes, and nest on land. Some of these species nest in large concentrations, and are known as colonial nesters.

Species in Anseriformes, Ciconiiformes, Gruiformes, and Charadriiformes comprise the numerous ducks, geese, swans, and shorebirds which use the bays, estuaries, and wetlands. Millions of waterfowl and shorebirds migrating to and from northern Alaska and Canadian breeding grounds spend part of their migration in Southeast Alaska. Nearly the entire known population of Vancouver Canada geese breeds and remains in Southeast Alaska throughout the year. Winter waterfowl populations vary according to the severity of winters, but are probably in excess of 500,000 annually.

The order Falconiformes includes five species of hawks, four species of falcons, two species of eagles and osprey. Only four breeding pairs of osprey have been documented on the Tongass, all from the Stikine Area. The reasons for so few osprey are not known, but some believe it may be the weather conditions or competition with bald eagles. The Forest supports the largest population of bald eagles in the world. During the 1980's, the estimated adult bald eagle population has increased from 10,000 birds to 12,000 birds, accounting for about 50 percent of Alaska's bald eagle population. Peale's peregrine falcon nest on the Forest; there are 32 known nest sites, with most of the nests occurring on cliffs facing the ocean. Populations of other species in this order are not known, but most are considered uncommon or rare in overall abundance.

The order Strigiformes includes between nine and eleven species of owls. The great horned owl and short-eared owl are considered the most common owls. There is not a understanding of the abundance and distribution of owls in Southeast Alaska.

The order Galliformes includes the upland game birds of blue grouse, spruce grouse, willow ptarmigan, rock ptarmigan, and white-tailed ptarmigan. Blue grouse and rock ptarmigan are common, while the other species are considered uncommon or rare. All of the species are legally hunted, however, no harvest records are available.

Six species of woodpeckers are included in the order Piciformes. These species are the common flicker, red-breasted sapsucker, hairy woodpecker, downy woodpecker, black-backed three-toed woodpecker, and northern three-toed woodpecker. These species are known as "primary cavity nesters". They excavate cavities in trees for their own use. These cavities are subsequently used by "secondary cavity nesters", which are species that cannot excavate their own cavities, and therefore use those excavated by other birds.

The remaining orders of Columbiformes, Caprimulgiformes, Apodiformes, Coraciiformes, and Passeriformes contain between 84 and 104 species. These species use a wide variety of forested and non-forested habitats, and vary in abundance from common to rare. Alaska Region Report Number 82 lists these species with estimated abundance ratings (Taylor 1979).

AMPHIBIANS AND REPTILES

Five amphibians are found on the Tongass National Forest, and include: rough-skinned newt, long-toed salamander, western toad, spotted frog, and wood frog. These species appear to be widely distributed throughout the islands in Southeast Alaska, and locally abundant in suitable habitat (personal communication with Forest biologists). One amphibian and two reptiles are considered peripheral species and include: Northwestern salamander, Pacific leatherback turtle, and common gartersnake. These peripheral species are on the geographic edge of their distribution and their presence in Southeast Alaska has usually been recorded only a few times. Reproduction has not been documented.

MANAGEMENT INDICATOR SPECIES

Management Indicator Species (MIS) are vertebrate or invertebrate species whose population changes are believed to indicate the effects of land management activities (USDA Forest Service 1982). MIS are a planning tool to promote more effective management of wildlife and fish habitats on National Forest Lands. Through the MIS concept, the total number of species that occurs within a planning area is reduced to a manageable set of species that collectively represent the complex of habitats, species, and associated management concerns. MIS are used to meet the requirements of the National Forest Management Act for maintenance of population viability and biological diversity and to establish management goals for species in public demand. Population viability is the ability of a population to sustain itself naturally.

The selection of Management Indicator Species for the Tongass Forest Plan Revision was a two step process. First, the Alaska Region cooperated with the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service to identify MIS for National Forest Lands in Alaska. This step resulted in the systematic evaluation of all the species occurring on National Forest Lands in Alaska. This systematic evaluation resulted in the identification of 22 wildlife species as potential MIS for use in Regional, Forest, and project level planning. The Alaska Region Technical Publication titled "Management Indicator Species for the National Forest Lands in Alaska" (Sidle and Suring 1986), provides a detailed overview of this step. The 22 wildlife species included: red squirrel, beaver, long-tailed vole, gray wolf, black bear, brown bear, marten, river otter, Sitka black-tailed deer, moose, mountain goat, Vancouver Canada goose, common merganser, northern goshawk, osprey, bald eagle, blue grouse, ptarmigan, red-breasted sapsucker, hairy woodpecker, brown creeper, and orange-crowned warbler.

Second, the Revision interdisciplinary team, in conjunction with the Tongass Forest Supervisors and the agencies participating in the first step identification of MIS, further evaluated and refined the MIS for the Revision. These evaluations resulted in the selection of 13 wildlife MIS for the Tongass Forest Plan Revision: mountain goat, Sitka black-tailed deer, river otter, marten, brown bear, black bear, gray wolf, red squirrel, Vancouver Canada goose, bald eagle, red-breasted sapsucker, hairy woodpecker, and brown creeper. Tables 3-158, 3-159 and 3-160 present a general overview of the habitats these species use on the Tongass National Forest. These wildlife MIS collectively use and represent, to some degree, all of the habitats on the Tongass National Forest.

from alpine to sea level, from early forest successional stages to old-growth stages, from wetlands and riparian areas to the drier habitats occurring in Southeast Alaska.

In selecting the Management Indicator Species, the NFMA Implementing Regulations require: "...the reasons for their selection will be stated" (CFR 219.19 (a)(1)). Sidle and Suring (1986) provide an excellent summary of the reasons for selecting the 22 wildlife species in the first step of the MIS selection process; we do not believe it is necessary to reprint their publication here. For the second step of the MIS selection process, the following summarizes the reasons for selecting the 13 wildlife MIS. The reasons that nine species were not selected will also be presented in this section.

Reasons for Selection

Mountain Goat: Mountain goat populations are perceived to be affected by Forest management activities. Public interest in them is high as is their economic value. They are used for subsistence. Mountain goats represent species using cliffs, alpine and subalpine, and old-growth forest habitats. Hunted populations are sensitive to overharvest and human disturbance.

Sitka Black-tailed Deer: Sitka black-tailed deer populations are perceived as being affected by Forest management activities. Public interest in them is high as is their economic value. Sitka black-tailed deer are the wildlife species receiving the highest subsistence use. Sitka black-tailed deer represent species using lower elevation old-growth forest habitats during the winter period (winter is recognized as the limiting habitat factor for deer and numerous other species in Southeast Alaska). RPA uses Sitka black-tailed deer as a management indicator species.

River Otter: Used as a subsistence species, river otter represent species using coastal and riparian habitats. Their populations are perceived to be affected by Forest management activities. Public interest in them is also high, as is their economic value. RPA uses river otter as a Management Indicator Species.

Marten: Marten are another species whose populations are perceived as being affected by Forest management activities. Public interest in them is relatively high, their economic value is high, and they are used for subsistence. Marten represent species using lower elevation old-growth forest habitats during the winter period (winter is recognized as the limiting habitat factor for marten and numerous other species in Southeast Alaska). Forest Management activities resulting in increasing access may result in overharvesting problems. RPA uses marten as a management indicator species.

Brown Bear: Brown bear are another species in which the public is highly interested. Their economic value is high, and their populations are perceived to be affected by forest management activities. They are also used as a subsistence species. Brown bear use habitats from sea level to alpine and require large expanses of habitat and protection from human disturbances. Brown bear are found on some islands in Southeast Alaska where black bear are not present. Threatened in the lower 48 States-- Brown bear are a national conservation issue. Some of the highest brown bear population densities in the world are found on the Tongass.

Black Bear: Subsistence is one of the uses of black bear on the Tongass. The species is of high public interest and high economic value. Its populations are perceived as being affected by forest management activities. Human activities

and disturbances have also been know to affect its populations, but black bear are not as sensitive to these problems as the brown bear. Black bear use habitats from alpine to sea level and may be found on some islands where brown bear are not present.

Gray Wolf: Gray wolves require an adequate prey base (ungulates, beaver, and salmon), which equates to a habitat capable of supporting that prey base. This species uses a wide variety of habitats where prey are present, affecting prey populations in those habitats. Although they are endangered in the lower 48 states, and a conservation issue there, this species is still hunted and trapped in Southeast Alaska. Because of its wide habitat and prey bases, its populations are perceived as being affected by forest management activities.

Red Squirrel: Red squirrel populations require stands of cone-producing trees and cavities in trees and snags. They represent a species which can do fairly well in second-growth timber stands at seed producing age. Due to their dependence on cone producing trees and cavities in trees in snags, populations of this species are perceived as being affected by Forest management activities.

Vancouver Canada Goose: Vancouver Canada geese, a resident year-round waterfowl species, use wetlands (both forested and non-forested) in the estuary, riparian, and upland areas of the forest. The public has shown interest in this species which is used for subsistence. Its populations are perceived as being affected by Forest management activities.

Bald Eagle: Endangered in the lower 48 states and a national conservation issue, some of the highest bald eagle populations in the world are found in Southeast Alaska. Their nesting habitat is primarily old-growth trees along the coast and within riparian areas. Populations of bald eagles are perceived as being affected by Forest management activities.

Red-breasted Sapsucker: Red-breasted sapsuckers are summer residents which require old-growth forest habitats with snags. They are called primary excavators because they excavate cavities for other cavity-using wildlife species. Public interest in them relates to their use of snags and their effect of cavity-nesting species. Red-breasted sapsuckers are perceived as being affected by Forest management activities.

Hairy Woodpecker: The public is concerned about snags and cavity-nesting species. Hairy woodpeckers are a year-round resident of Southeast Alaska who require old-growth forest habitats with snags. Like the red-breasted sapsucker, hairy woodpeckers are primary cavity excavators for other cavity-using wildlife species. Their winter habitat may be their most limiting. Hairy woodpecker populations are perceived as being affected by Forest management activities. Hairy woodpeckers are a management indicator species for RPA.

Brown Creeper: The brown creeper is a year-round resident of Southeast Alaska which requires old-growth forest habitats. This species is most dependent on high volume old growth. Old-growth dependent species are a public concern. Brown creeper populations are perceived as being affected by Forest management activities.

TABLE 3-158

MAJOR HABITAT CATEGORIES USED BY THE MANAGEMENT INDICATOR SPECIES.

Species	Habitat Categories: Spruce/ Hemlock Forest 1/	Deciduous Forest or Shrub 2/	Alpine/ Tundra 3/	Grass/ Sedge Meadow 4/	Estuarine 5/	Marsh 6/	Riverine 7/	Lacustrine 8/
Red Squirrel	X							
Black Bear	X	X	X	X	X		X	
Brown Bear	X	X	X	X	X		X	
Marten	X						X	
River Otter	X				X		X	X
Sitka Black-tailed Deer	X		X					
Mountain Goat	X	X	X					
Gray Wolf 9/								
Vancouver Canada Goose	X			X	X	X	X	X
Bald Eagle	X				X		X	X
Red-breasted Sapsucker	X	X						
Hairy Woodpecker	X							
Brown Creeper	X							

Source: USDA Forest Service

1/ Closed or open forests dominated by Sitka spruce, western hemlock, or a mixture of the two species.

2/ Deciduous forest or tall shrub community dominated by red alder, willow, cottonwood, or other deciduous species.

3/ Includes areas above tree line in SE Alaska.

4/ Meadows, coastal grassflats above high tide (often associated with estuarine), and all other upland habitats dominated by grasses and/or sedges.

5/ Fiord and tidal mixed estuaries and associated mudflat habitats and immediately adjacent habitats.

6/ Fresh water and saltwater marshes including tidal marshes, dominated by grasses and sedges.

7/ Freshwater rivers and streams.

8/ Freshwater lakes and ponds.

9/ Gray wolves will use all habitat categories which are utilized by their prey species.

TABLE 3-159

RELATIVE IMPORTANCE OF CONIFER SUCCESSIONAL STAGES AND OLD-GROWTH HABITATS FOR THE MANAGEMENT INDICATOR SPECIES. 1/

	Early Succession	Mid-Succession Stages		Old Growth Stage >200 years 2/			
Species & (Season) 3/	0-25 years	26-150 years	150-200 years	< V.C. 4	V.C.4	V.C.5	V.C.6+
Red Squirral (5)	L	L-H	H	L	M-H	M-H	M-H
Black Bear (2,3,4)	M	L	L	M	M-H	M-H	M-H
Brown Bear (3)	L	L	L	M-H	M-H	M-H	M-H
Marten (1)	L	L	L	L	M	H	H
River Otter (2,3)	L	L	M	L	H	H	H
Sitka Black-tailed Deer (1)	L-M	L	L-M	L-M	M	H	H
Mountain Goat (1)	L	L	L	L	M-H	H	H
Gray Wolf (5) 4/							
Vancouver Canada Goose (2,3)	L	L	L	H	H	H	H
Bald Eagle (2,3)	L	L	L	L	H	H	H
Red-breasted Sapsucker (2,3)	L	L	L	L	H	H	M
Hairy Woodpecker (1)	L	L	L	L	L	M	H
Brown Creeper (1)	L	L	L	L	L	L	H

Source: USDA Forest Service

1/ H = Highest importance with highest population densities
M = Moderate importance with moderate population densities
L = Least importance with lowest population densities

2/ Old Growth is divided into the following types: <V.C.4 = all old growth forest lands less than 8,000 board feet per acre; includes muskeg forest. V.C.4 = old growth with 8-20,000 board feet per acre. V.C.5 = old growth with 20-30,000 board feet per acre. V.C.6+ = old growth with 30,000 + board feet per acre.

3/ Season codes are as follows: 1=winter, 2=spring, 3=summer, 4=fall, 5=all year.

4/ Gray wolves will use habitats according to abundance and availability of pray species.

TABLE 3-160

RELATIVE IMPORTANCE OF NON-FORESTED HABITATS FOR THE MANAGEMENT INDICATOR SPECIES. 1/

Species & (Season) 2/	Ocean	Estuarine	River/ Stream	Lake	Cottonwood	Red Alder	Avalanche Chutes	Muskeg	Alpine	Cliffs/ Rocks
Red Squirrel (5)	O	O	O	O	L	O	O	O	O	O
Black Bear (2,3,4)	O	H	M-H	O	L	L	M-H	L	L	O
Brown Bear (3)	O	H	M-H	O	L	L	M	L	L-M	O
Marten (1)	O	O	O	O	O	O	O	O	O	O
River Otter (2,3)	H	H	M	M	H	O	O	L	O	O
Sitka Black-tailed Deer (1)	O	O	O	O	O	O	O	O	O	O
Mountain Goat (1)	O	O	O	O	O	O	L	O	L-M	M
Gray Wolf (5) 3/										
Vancouver Canada Goose (2,3)	L	H	H	H	L	O	O	L	O	O
Bald Eagle (2,3)	H	H	L-H	L-H	M	O	O	O	O	O
Red-breasted Sapsucker (2,3)	O	O	O	O	H	L	O	O	O	O
Hairy Woodpecker (1)	O	O	O	O	L	L	O	O	O	O
Brown Creeper (1)	O	O	O	O	L	O	O	O	O	O

Source: USDA Forest Service

1/ H = Highest importance with highest population densities

M = Moderate importance with moderate population densities

L = Least importance with lowest population densities

O = Habitat is not used by the species.

2/ Season codes are as follows: 1=winter, 2=spring, 3=summer, 4=fall, 5=all year.

3/ Gray wolves will use habitats according to abundance and availability of prey species.

Reasons for Non-Selection

Beaver: Beaver populations are perceived as only being moderately affected by forest management activities. They use riparian habitats and a wide variety of vegetative conditions within the riparian areas. Beaver populations would be sustained with a wide variety of management activities.

Long-tailed Vole: Populations of long-tailed vole are perceived as only being moderately affected by Forest management activities, using early successional vegetation stages with grasses, sedges, and forbs. Their populations would be sustained throughout the Forest with a wide variety of management activities. Public concern for this species was low.

Northern Goshawk: Northern Goshawks use mature and old-growth forests, but information on this species' distribution and abundance was so limited that it would be impossible to use it as a Management Indicator Species. Other selected Management Indicator Species use old-growth forest habitats which overlap to various degrees with those used by the goshawk.

Osprey: The abundance and distribution of Osprey on the Forest is very limited--there are only four known nesting pairs, all on the Stikine Area. Reasons for their limited distribution and abundance are unknown. Osprey can be handled very easily as a MIS at the project-level of planning, and are not needed at the Forest planning level.

Ptarmigan: Ptarmigan use chiefly non-forested alpine and subalpine habitats, where few (if any) management activities would occur that would affect their habitats or populations.

Orange-crowned Warbler: Populations of orange-crowned warbler are perceived as only being moderately affected by Forest management activities. They use early successional vegetation stages with dense shrubs for nesting. Their populations would be sustained throughout the Forest with a wide variety of management activities. The public did not seem to be concerned with this species.

Blue Grouse: A wide variety of habitats are used by blue grouse on the Forest, very similar to the wide variety of habitat use represented by the black bear; black bears would illustrate similar trends in habitats and populations as the blue grouse, and potential effects on habitats and populations would not be as great as with other species which have narrower habitat requirements.

Common Merganser: The Common Merganser uses riparian areas and nests in snags with cavities, in thick cover on the ground, and in rock crevices. Other riparian Management Indicator Species (river otter and bald eagle) along with the fish MIS adequately represent riparian habitats and the common merganser was not needed.

Moose: Moose are not widespread on the Forest, modeling their habitat with resource information from the GIS would be very difficult, if not impossible. Moose would be more effectively used as a project level MIS in specific areas where they occur rather than a Forest Plan Management Indicator Species. The Alaska Department of Fish and Game has requested that the Revision Interdisciplinary Team present information on current distribution and habitat conditions for moose, and to display possible changes in habitat conditions with various alternatives.

MIS HABITAT AND POPULATION INFORMATION

The following information will be presented for the 13 wildlife Management Indicator Species.

Distribution. The historical and current distribution of each species will be discussed. (ALL EVALUATIONS AND DISCUSSIONS DURING THE REVISION REGARDING HABITAT QUANTITY, QUALITY, CAPABILITY, AND POPULATION TRENDS FOR EACH OF THE MIS APPLY ONLY TO THESE DOCUMENTED HISTORICAL AND CURRENT DISTRIBUTIONS).

Literature Review: A brief literature review will be presented for each of the Management Indicator Species, highlighting the research and management information for Southeast Alaska. (The Revision Team would like to acknowledge the following individuals for their efforts in helping to compile this literature review: Lowell H. Suring for his work on Sitka black-tailed deer, black bear, river otter, bald eagle, mountain goat, hairy woodpecker, brown creeper, marten, gray wolf, red-breasted sapsucker, and red squirrel; John W. Schoen for his work on brown bear, and Arlene T. Doyle for her work on Vancouver Canada goose.)

Habitat Suitability and Capability: NFMA implementing regulations give the following direction: "On the basis of available scientific information, the interdisciplinary team shall estimate the effects of changes in vegetation type, timber age classes, community composition, rotation age, and year-long suitability of habitat related to mobility of management indicator species" (36 CFR 219.19 (a)). "Planning alternatives shall be stated and evaluated in terms of both amount and quality of habitat and of animal population trends of the management indicator species" (36 CFR 219.19 (a)(2).

To be responsive to this direction, this section will identify the following:

1) which seasons of the year are most limiting for each of the MIS;

2) the vegetation types, features and successional stages used by each species and the importance of each of the types and features;

3) the effects of such geographic features as aspect, elevation and location in southeast Alaska which affect the quantity and quality of the species habitat;

4) the effects of habitat fragmentation, that is, the relationship of patch sizes on the quality of habitat and the need for corridors for movement and distribution.

Combined together, these factors establish habitat suitability for each of the MIS. In addition, the capability of these habitats to support different population levels of each of the MIS will be presented; this is known as habitat capability.

Human Disturbance or Mortality Factors: NFMA implementing regulations direct that: "Access and dispersal problems of hunting, fishing, and other visitor uses shall be considered" (36 CFR 219.19 (a)(4). This section will identify management concerns dealing with the displacement or disturbance or increased mortality of a species due to the presence of humans. These factors can either reduce the quantity or quality of the habitat for a species, or result in increased mortality of that species. Population declines due to overharvesting as the result of legal hunting seasons is the responsibility of the State; and will be indicated where believed to be a management concern.

Viable Populations: NFMA implementing regulations direct that: "Fish and wildlife habitat shall be managed to maintain viable populations of existing native and desired non-native vertebrate species in the planning area. For

planning purposes, a viable population shall be regarded as one which has the estimated numbers and distribution of reproductive individuals to insure its continued existence is well distributed in the planning area. In order to insure that viable populations will be maintained, habitat must be provided to support, at least, a minimum number of reproductive individuals and that habitat must be well distributed so that those individuals can interact with others in the planning area" (CFR 219.19). This section will identify the population sizes and distributions considered necessary to meet this NFMA direction. Several points must be emphasized regarding the population sizes and distributions discussed in this section: 1) "Viability" is an attribute that is difficult to define in absolute numbers (Samson et al. 1985). An exact viable population number is not reasonable to calculate without a lot of detailed population dynamics information for each species, and this kind of information was not available for species in Southeast Alaska. The approach used to estimate viable populations was that 50 reproductively active adults with equal sex ratio provide short-term viability, and 500 reproductively active adults with equal sex ratio provide long-term viability (Brussard 1986, Franklin 1980, Frankel and Soule 1981, Lande and Barrowclough 1986). 2) "Well distributed" is also an attribute that is difficult to define. For the island situation on the Tongass National Forest, well distributed is different for species which easily move between islands compared to species which do not have the ability to move between islands. "Well distributed" must consider the natural distribution of species among the islands, as well as distribution patterns created by introductions of species to islands. Some islands are too small to support a viable population by themselves. The approach used for maintaining viable populations well distributed in the planning area was to develop units of land and/or groups of islands which would be capable of supporting viable populations, taking into account the distribution, dispersal capabilities, and the size of area needed to support a viable population. 3) The MIS were used for identifying viable populations and "well distributed" criteria, recognizing that their habitats represent the habitats for other vertebrate species. The MIS habitat capability models were used to identify the amount of habitat needed to sustain the viable populations. 4) The viable population sizes and the "well distributed" criteria were developed to help set the limits for all alternatives to ensure that viable populations would be well distributed in all alternatives. The population sizes and distributions are used to help answer the question "How much commodity resource development (logging, minerals, etc.) can occur while still maintaining viable populations?"

MOUNTAIN GOAT

Distribution

Historically, mountain goats in Southeast Alaska were present only on the mainland. Although capable of swimming, they did not naturally disperse from the mainland to the islands. Klein (1963) cites a reference of one mountain goat being observed on Wrangell Island for several years, but a population was never naturally established. Through cooperative transplant work between the Alaska Department of Fish and Game and the Forest Service, mountain goats are now present on many of the islands. Mountain goats are currently found within the following Value Comparison Units (VCU's): 1-32, 38-92, 95-123, 287-302, 311-332, 344-350, 352-356, 374, 375, 378, 384, 385, 390, 391, 393, 394, 482-506, 507-524, 526, 708-730, 734, 744-746, 754, 775-777, 778, 779, 782-823, 826-828, 833-854, 856-858 (See Tongass map in the records for the locations of VCU's).

Literature Review

Mountain goats are generally associated with steep and rocky terrain. In the summer months, they move to high elevation subalpine and alpine habitats. Summer habitat has abundant food and cover resources, and is not considered limiting to goat populations. With the coming of winter and deep snows, winter habitat becomes limiting for mountain goat.

Fox and Smith (1988) found that food available to mountain goats during the winter is much more restricted than in other seasons. Heavy wet snow accumulations in the alpine and subalpine areas, especially in southern Southeast Alaska, cover available forage, and force mountain goats into lower elevation forested areas (Smith 1986). Old-growth conifer forests provide optimum habitat for mountain goats under these conditions. Forbs and shrubs remain available as forage in the higher volume, old-growth forests, because snow depths are reduced by tree canopy snow interception (Hanley and Rose 1987; Kirchhoff and Schoen 1987). The bulk of the mountain goats' diet during the winter in old-growth forests consists of conifers, lichens, mosses, and shrubs (Fox et al. in prep.).

Timber harvesting practices, such as clearcutting, create early successional stages with abundant shrub and forb communities increasing the abundance of forage. However, due to snow accumulations, this forage may not be available to mountain goats during the winter. Following the early successional stage, the canopies of second-growth forest stands begin to close and the shrubs and forbs are shaded out (Alaback 1982 and 1984). Second-growth forest stands lack forage and are assumed not to be of winter value to mountain goats.

In some areas of northern Southeast Alaska, the snow is drier and lighter. In these areas snow is blown off ridgetops exposing plants and allowing mountain goats to forage at higher elevations including alpine areas. In these areas, alpine forbs and graminoids continue to be important components of the mountain goats' diet throughout the winter.

Mountain goats prefer southerly aspects, and avoid northerly aspects during the winter (Schoen and Kirchhoff 1982). Southerly aspects receive more sunlight, are warmer, have a higher snow line, and accumulate less snow than northerly exposures. This results in more readily available forage and less restricted travel.

Fox (1983) found that most mountain goat habitat use in Southeast Alaska was within 660-980 feet (200-300 meters) of cliffs. Smith (1986) found that 95 percent of all radio-collared mountain goats in southern southeast Alaska were within 1,300 feet (400 meters) of cliffs, and no goats were found beyond 2,600 feet of cliffs. Mountain goats' use of their habitat is affected by their avoidance of their predator, the gray wolf. When goats are approached by gray wolves, they generally move into steep and broken cliff terrain (Fox and Streveler 1986). The closeness of escape terrain appears to be a critical factor. Prime mountain goat escape terrain has been defined as slopes from 45 degrees to 75 degrees (Kuck 1973, Smith 1976, McFetridge 1977a, Fox 1978, Schoen and Kirchhoff 1982).

McFetridge (1977b) indicated that human activities may reduce use of habitats by mountain goats. Chadwick (1973) reported that mountain goats will abandon habitat that is otherwise suitable, if human activities are initiated. Five of the seven populations of mountain goats evaluated in British Columbia declined (Pendergast and Bindernagel 1977). Four of these declining populations were accessible by road, where none of the stable populations were accessible by

road. These reports and personal observations (Dinneford, Schoen, and Young) indicate that mountain goat populations are very sensitive to human disturbance and poaching that the follows the establishment of human activities in their occupied habitat.

Habitat Suitability and Capability

The quantity and quality of winter habitat is the most limiting factor for mountain goats in Southeast Alaska. Winter habitats are the habitats most likely to be affected by Forest management activities.

A mountain goat winter habitat capability model was developed by an interagency task group, and is described by Suring, et al. (1988). This model identifies the following variables in describing the value of winter habitats:

Cliffs. Cliffs must be present for an area to be used by mountain goats. Cliffs are defined as slopes greater than 50 degrees.

Distance from Cliffs. The area of land within 0-1,300 feet of cliffs has the highest value to goats. Habitat value is lower from 1,300-2,600 feet from cliffs. There is no habitat value for areas greater than 2,600 feet from cliffs.

Location in Southeast Alaska. Habitat use by mountain goats differs between southern and northern Southeast Alaska. The dividing line between southern and northern is Frederick Sound. Non-forested alpine habitats in the northern portion have higher value than non-forested alpine habitats in the southern portion because northern alpine habitats are blown free of snow, and are available for use.

Aspect. South aspects have the highest value, north aspects the lowest value, and east and west aspects intermediate values as habitat. Snow depths are deeper and persist longer on northern exposures. Southern aspects receive the highest amount of radiation from the sun, have the lowest snow depths, and the shortest time covered by snow.

Vegetation. The successional stage of the forest vegetation influences the quantity and availability of food during the winter season. Old-growth forests have the highest value because they intercept snow and provide understory forage plants. Lack of snow interception in early successional stages, and lack of forage in middle successional stages reduces their value as habitat.

Patch Size and Corridors. Mountain goats have not been identified as a species requiring minimum patch sizes of a particular habitat type. Their habitats consist of steep, broken terrain with a variety of habitat patch sizes and patterns. Similarly, they do not have specific vegetative corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions (ref. July 31 and August 1, 1989 Interagency workshop).

Figures 3-62, 3-63, 3-64 and 3-65 (following table 3-161) display the interrelationships of all of these variables in evaluating the suitability and capability of habitats for wintering mountain goats. Habitats with the highest value receive a Habitat Suitability Index rating of 1.0, and are capable of supporting an average of 11.4 goats per square mile of habitat.

Human Disturbance and Mortality Factors

Goats which are not hunted, such as those found in several National Parks, are very tolerant to human presence. However, goat populations which are hunted are very sensitive to human presence, and poaching and overharvest may occur without carefully administered harvest regulations and enforcement. Suring et al. (1988) estimated the effects of human development and access on winter habitats and populations (Table 3-161). As human access and development increase human access into occupied goat habitat, the quality and capability of the habitat declines.

TABLE 3-161
EFFECTS OF DISTURBANCE ON THE HABITAT CAPABILITY FOR MOUNTAIN GOATS IN SOUTHEAST ALASKA

Type of Human Access or Development	Habitat Capability Reduction (in percent)
FS Cabin/Developed Campground/Seasonal Camp within one mile of occupied habitat	10
Permanent Camp Site/Residence/Float Camp	
-- within one mile of occupied habitat	40
-- one to five miles from occupied habitat	10
Access Point (airstrip, dock, floatplane lake) within one mile of occupied habitat	10
Road Accessible to Vehicles within two miles of occupied habitat	20
Transportation Link (ferry access/town) within two miles of occupied habitat	40
Trails or Road Access Limited to Hiking within two miles of occupied habitat	10

Source: Suring et al. 1988

Viable Populations

Mountain goat populations can be characterized as small groups of animals scattered throughout suitable habitat within their occupied range. To maintain "well distributed" populations within that occupied range, the following geographic units were identified: ADF&G Game Management Unit 1A (mainland), Revillagigedo Island, Cleveland Peninsula to the Stikine River, Stikine River to the Taku River, Taku River to the Chilkat River, Chilkat Mountain Range plus Glacier Bay National Park, and Baranof Island. Within each of these seven geographic units, maintain habitat to support 125 animals to achieve a well distributed population and to maintain population viability within the planning area (reference Interagency meeting records of September 26, 1988 and January 6, 1989).

FIGURE 3-62
WINTER HABITAT SUITABILITY FOR MOUNTAIN GOATS IN NORTHERN SOUTHEAST ALASKA, BY DISTANCE FROM CLIFFS, ASPECT, AND CONIFER SUCCESSIONAL STAGE. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; SA= productive subalpine old-growth stands (subalpine is defined as 1500-2000 feet elevation); A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988

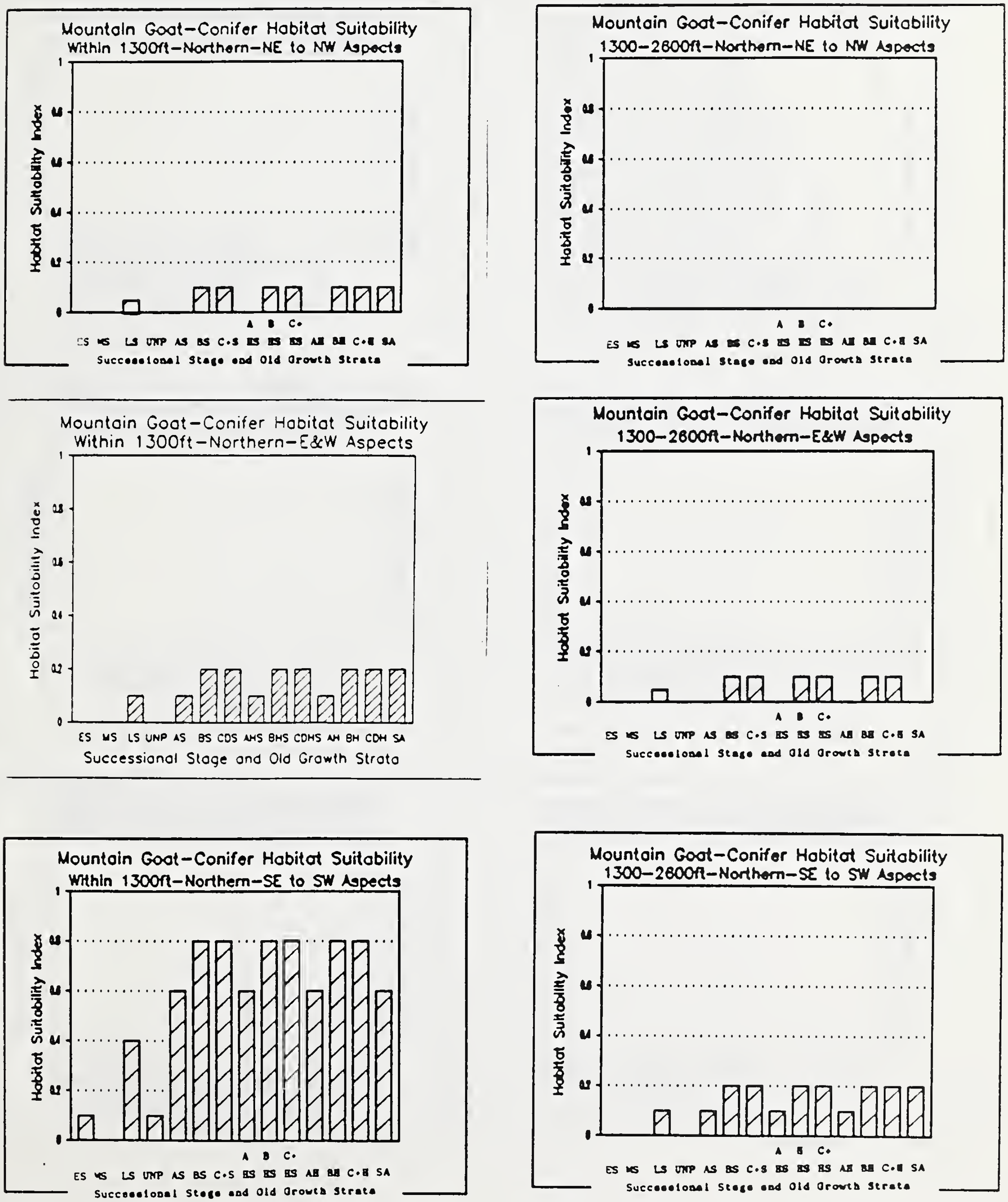


FIGURE 3-63

WINTER HABITAT SUITABILITY FOR MOUNTAIN GOATS IN SOUTHERN SOUTHEAST ALASKA, BY DISTANCE FROM CLIFFS, ASPECT, AND CONIFER SUCCESSIONAL STAGE. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; SA= productive subalpine old-growth stands (subalpine is defined as 1500-2000 feet elevation); A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988

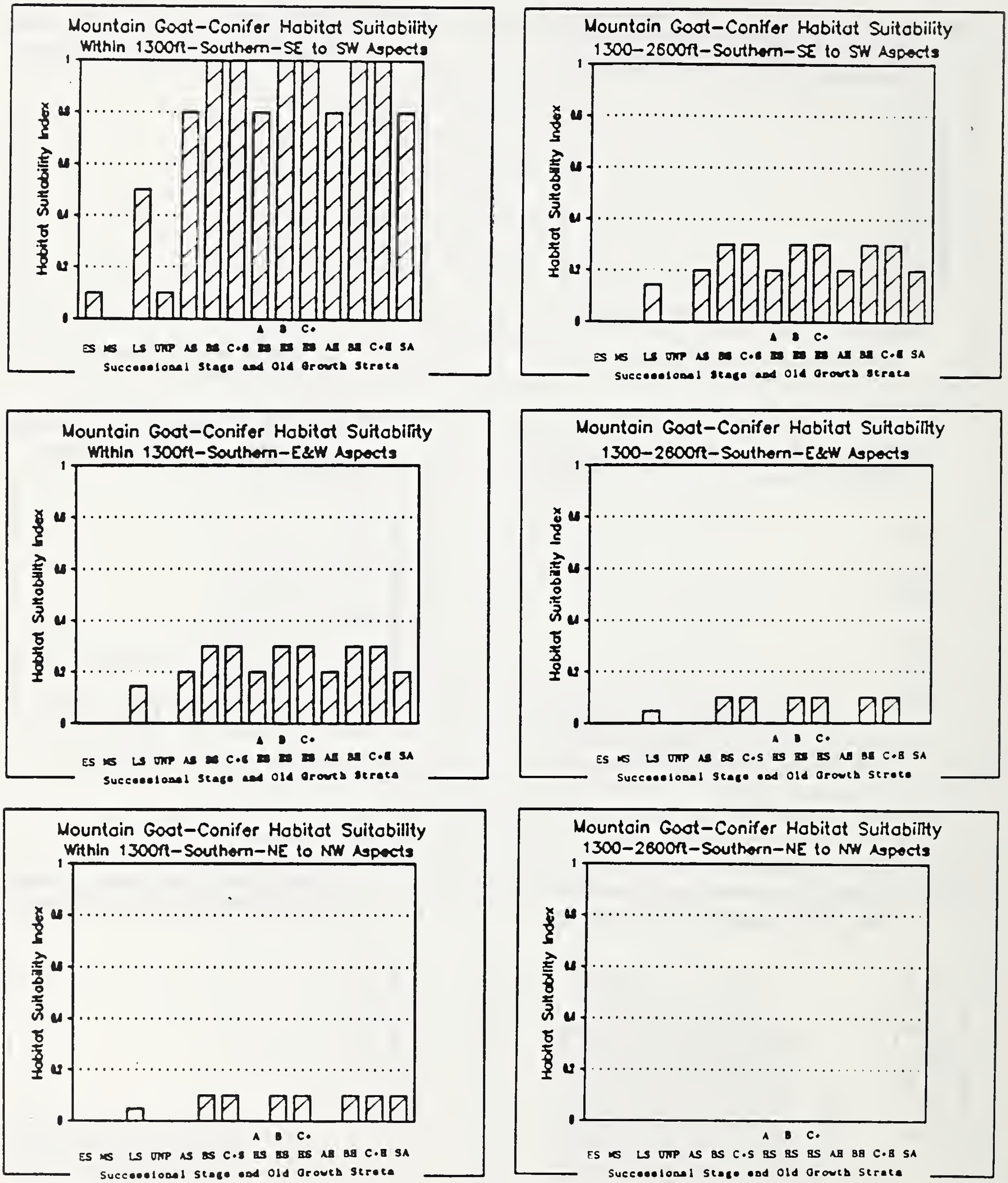
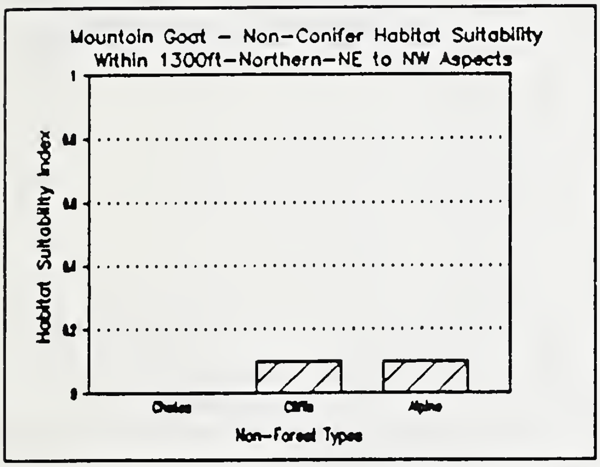
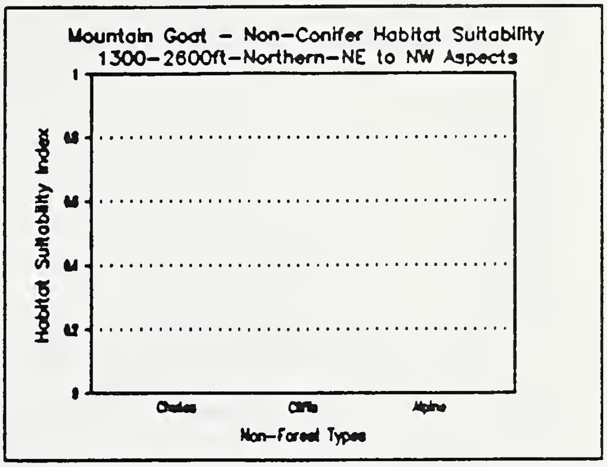
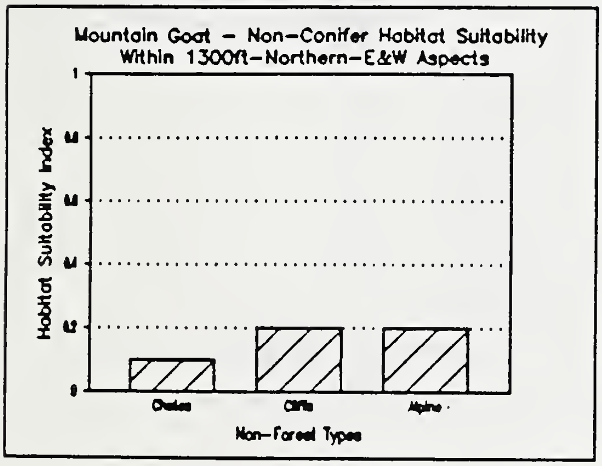
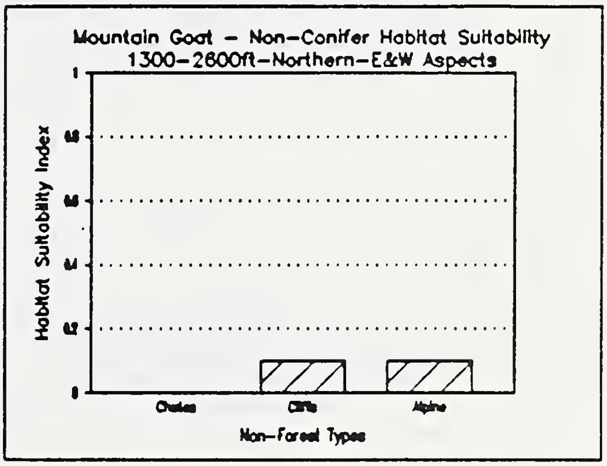


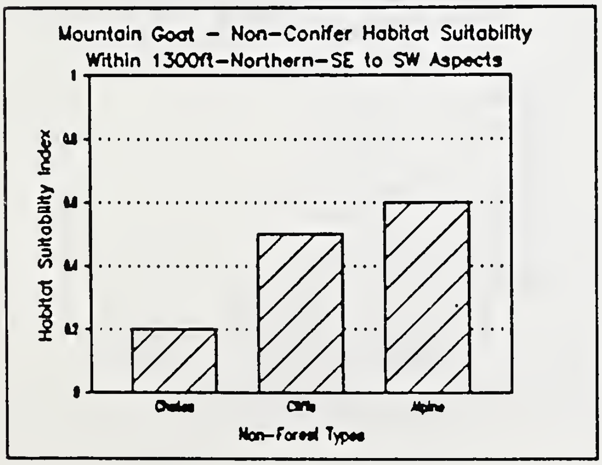
FIGURE 3-64
WINTER HABITAT SUITABILITY FOR MOUNTAIN GOATS IN NORTHERN SOUTHEAST ALASKA, BY DISTANCE FROM CLIFFS, ASPECT, AND NON-CONIFER HABITATS. (Non-forest type definitions are as follows: Chutes= avalanche slides or chutes; Cliffs= lands with greater than 50 degree slopes; Alpine= vegetation above 2000 feet elevation). Source: Suring et al. 1988











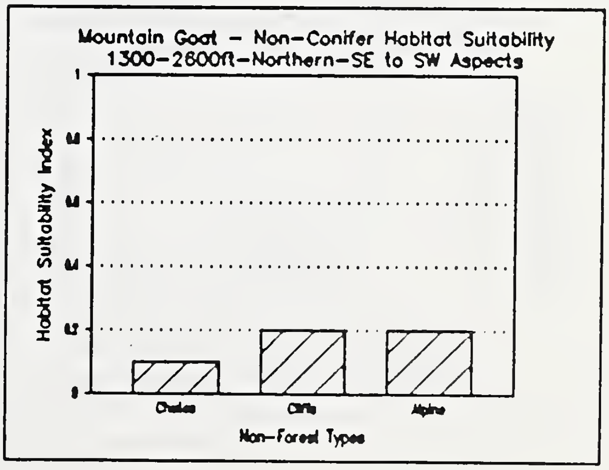
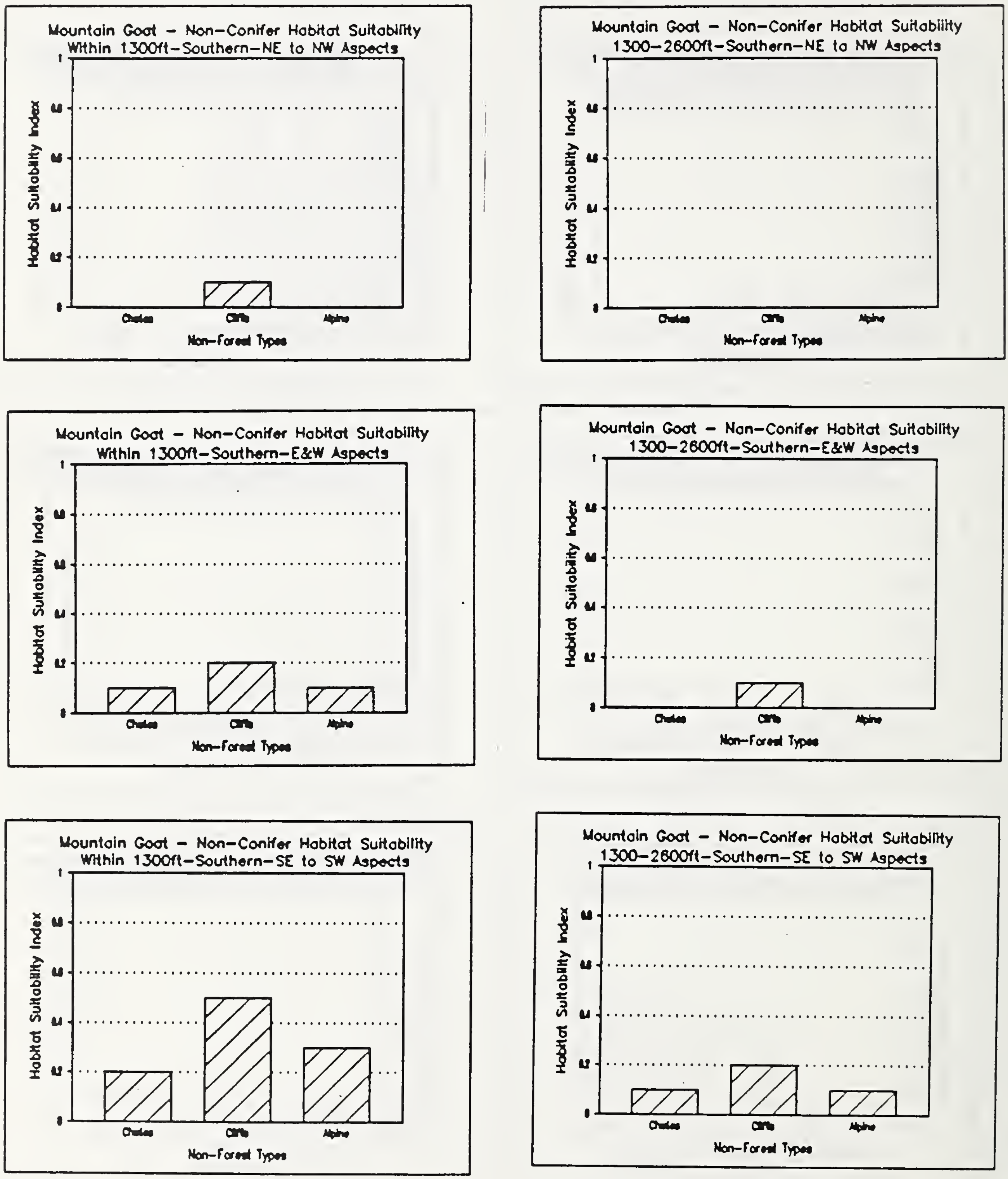


FIGURE 3-65
WINTER HABITAT SUITABILITY FOR MOUNTAIN GOATS IN SOUTHERN SOUTHEAST ALASKA, BY DISTANCE FROM CLIFFS, ASPECT, AND NON-CONIFER HABITATS. (Non-forest type definitions are as follows: Chutes= avalanche slides or chutes; Cliffs= lands with greater than 50 degree slopes; Alpine= vegetation above 2000 feet elevation). Source: Suring et al. 1988



SITKA BLACK-TAILED DEER

Distribution

This subspecies occupies the northern-most extreme of black-tailed deer habitat. Sitka black-tailed deer are indigenous to the coastal regions of Southeast Alaska and northwest British Columbia (Regelin 1979). Deer are strong swimmers, and have occupied all islands of the Alexander Archipelago, except Forrester Island, capable of supporting them (Klein 1963). On the mainland, deep snow and harsh weather conditions affect deer populations; few deer are found on the mainland from Glacier Bay National Park northward. Deer were unsuccessfully introduced to the Yakutat area. Presently, few deer can be found on the islands near Yakutat. At the present time, Sitka black-tailed deer are not found in the following Value Comparison Units (VCU's): 1-15, 18, 19, 21, 26, 28-31, 39-50, 53, 55-67, 71, 72, 76-79, 84, 91-92, 95-114, 116, 118, 119, 121-123, 352-395, 481, 488, 494, 498, 499, 500, 506, 507, 513, 515, 516, 783-790, 794-799, 801-817, 835, 837-853, 856, 867 (note: deer may be present in these VCU's in low numbers, especially when weather patterns produce lighter than normal winter weather; however, viable deer populations are generally not present in these VCU's).

Literature Review

Winter range is assumed to limit deer populations in Southeast Alaska (Suring et al. 1988; Hanley and McKendrick 1985). Snow depth and forage availability affect deer populations during the winter. During low snow conditions, when habitat selection is not significantly influenced by snow, deer will select habitats that provide the best foraging opportunities. Under intermediate and deep snow conditions, deer will select those habitats that provide snow interception and food availability. Up to four inches of snow in open areas will cover the deer's preferred forage (evergreen forbs and half shrubs). As snow depths increase, Sitka black-tailed deer winter survival becomes increasingly difficult (Hanley 1984). Snow depths of over 12 inches impede the deer movement and increase energy cost to the deer. Alternative food sources such as shrubs may also be covered by deep snow pack.

About 75 percent of the deer studied by Schoen and Kirchhoff (1985) migrated from low elevation winter ranges to high elevation (alpine) summer ranges. The remaining 25 percent remained in low elevation habitats throughout the year. The migrating deer spend winter at as high an elevation as snow conditions will allow. Schoen and Kirchhoff (1985) reported a mean elevation of 720 feet for wintering deer during a low snow winter and 450 feet during a deep snow winter. Forested winter range at lower elevations is more valuable to deer than higher elevation winter range where snow makes forage unavailable and movement difficult.

Old-growth stands dominated by tall, large-branched, large diameter trees provide a multi-layered, relatively closed canopy that intercepts snowfall. These characteristics describe high volume stands of western hemlock (Tsuga heterophylla) and Sitka spruce (Picea sitchensis) (Hanley and Rose 1987; Kirchhoff and Schoen 1987). They support an abundant understory of high quality forage making them extremely valuable for deer (Hanley and McKendrich 1985). The combination of snow interception and the presence of herbaceous and shrub vegetation insures that deer forage will be available in old-growth forests through all but the most severe winters. Old-growth forests also provide thermal and hiding cover. Rose (1982) and Schoen, et al. (1985) found that open stands with lower timber volumes received decreasing deer use.

Throughout their geographic range, Sitka black-tailed deer consume nearly 60 plant species (numerous studies cited by Hanley 1984). Sitka black-tailed deer's preferred winter forage is succulent, evergreen half shrubs and forbs including

bunchberry dogwood (Cornus canadensis), five-leaved bramble (Rubus pedatus), gold thread (Coptis aspleniifoliea), foam flower (Tiarella trifoliata), and pyrola (Pyrola secunda). As snow accumulates at high elevations and covers these preferred forage species, deer will move to lower elevations (Schoen and Kirchhoff 1985). When preferred plant species are covered with snow throughout the deer's winter range, deer rely primarily on blueberry (Vaccinium spp) shrubs.

Deer also feed on arboreal lichens, those lichens which live on trees. When these lichens are dislodged from the trees by the wind and land on the ground, they then become available to the deer as food. In some areas (e.g., Vancouver Island) lichens have been reported as one of the major constituents of black-tailed deer diet (Bunnell 1979). They provide large amounts of energy and may enhance the digestibility of other foods (Rochelle 1980), and are a particularly important source of energy for deer during intermediate to heavy snow winters because they are available as litterfall on top of the snow.

Management activities affect forage opportunities on deer winter habitat. Vegetation structure and composition respond predictably after severe disturbance (such as clearcut logging) to old-growth conifer stands. Alaback's studies (1982a, 1982b, and 1984) on highly productive old-growth sites have shown growth responses of shrubby and herbaceous vegetation immediately following clearcutting. Although plants which are primarily winter food for deer show a dramatic increase in production in the first 10 years after logging, research shows that forage species growing under the old-growth canopies in Southeast Alaska are more palatable to and nutritious for deer than the same species in grown in clearcuts (Billings and Wheeler 1979; Rose 1982; Hanley et al. 1987). Shrubs begin to dominate clearcuts after 10 years, reducing the number of forbs and half-shrubs that are preferred by deer. After 20 years, the tree overstory begins to close, decreasing the amount of light reaching the forest floor resulting in a rapid reduction of understory plants (Alaback 1984). Precommercially thinning stands at age 10 to 15 years may extend the forage productivity for another 5-10 years (Kessler 1982, 1984). Clearcuts are of their greatest value during mild winters, when their forage is available to deer. Forage becomes less available during moderate winters and is unavailable during severe winters (Bloom 1978). Limited forage production persists under the dense forest canopies until stands reach 120 to 160 years of age, when an understory again begins to develop.

Aspect may also affect the availability of forage on deer winter habitat. Southerly aspects receive more sunshine than northerly aspects during southeast Alaska winters (Hanley 1984) and therefore are more useful during the winter. Deer on south facing slopes are better able to conserve their body heat. Snow melts faster on south-facing slopes making more forage available. South facing slopes are not only preferable for deer during the winter, but Hanley (1984) found that deer preferred them in the fall and spring as well.

Habitat Suitability and Capability

The quantity and quality of winter habitat is the most limiting factor for Sitka black-tailed deer in Southeast Alaska. Winter habitats are also the habitats most likely to be affected by Forest management activities. A deer winter habitat capability model was developed by an interagency task group, and is described by Suring, et al. (1988). This model identifies the following variables in describing the value of winter habitats:

Snow Depths/Winter Severity. Average winter severity has a great effect on the distribution and abundance of deer. Mainland areas with high snowfall have fewer

deer or no deer, while outer islands which have less snow have higher numbers of deer. A snow depth rating was developed for each VCU on the Forest to describe the average winter conditions for the VCU (Table 3.xx). The rating system was developed by the Alaska Department of Fish and Game (ref. letters dated 19 August 1988 and 13 February 1989), and is defined as follows:

Low Snow - zero days with more than 12 inches of snow on the ground, mean annual snowfall 0-20 inches.

Moderate Snow - 19 days with more than 12 inches of snow on the ground, mean annual snowfall 20-80 inches.

Deep Snow - 55 days with more than 12 inches of snow on the ground, mean annual snowfall 80-160 inches.

Extreme Snow - more than 160 inches of snow; do not have viable deer populations.

Elevation. Lower elevations are more valuable to deer than are higher elevations. When snow depths at higher elevations become deep, the deer migrate to lower elevations. The following elevation breaks are used: 0-800 feet on all aspects; 800-1,200 feet on north aspects; 800-1,500 feet on all other aspects; above 1,200 feet and 1,500 feet there is no value for deer winter range.

Aspects. North aspects (316 degrees to 45 degrees) have lower value as deer winter range than the other aspects.

Riparian Areas. Due to lack of favorable forage, Sitka spruce stands in riparian areas have low value to wintering deer. Deciduous tree stands in riparian areas have no value for wintering deer.

Vegetation. The successional stage of the forest vegetation influences the quantity and availability of food during the winter season. Old-growth forests have the highest value because they intercept snow and provide understory forage plants. Lack of snow interception in early successional stages, and lack of forage in middle successional stages reduce their value as habitat.

Patch Size and Corridors. The effect of patch size on the habitat suitability and capability for deer in Southeast Alaska is poorly understood and not well developed at this time. As indicated in the current draft documentation for the deer model (Suring 1988), this parameter has not been addressed in studies of deer and their habitat in Southeast Alaska. However, the interagency deer modeling task group developed the following patch size relationship (reference letter dated October 12, 1989; Suring, et al. 1988): Small patches of old-growth winter habitat on larger islands or the mainland with resident wolves offer far less security from wolves. Fragmentation of deer winter range into isolated islands of old growth will concentrate deer in predictable areas, reducing predator search time, which may precipitate sharp declines in deer. This hypothesis has been advanced by researchers in British Columbia and Southeast Alaska (Hebert 1982; VanBallenberghe and Hanley 1984; Smith et al. 1986). Figure 3-66 estimates this relationship; old-growth patch sizes 1,000 acres or larger are estimated to provide optimum deer habitat use. The interagency task group states that this general relationship is intuitively correct, consistent with principles of the theory of island biogeography (Brown and Gibson 1983, Harris 1984), and supported by data on mule deer (Picton and Mackie 1980). There are no specific corridor requirements for deer (ref. July 31 - August 1, 1989 interagency meeting record).

Wolf Predation. There are more deer, on the average, in areas without wolves than in areas with wolves.

Figures 3-67, 3-68 and 3-69 display the interrelationships of all of these variables for areas without wolves. Habitats with the highest value receive a Habitat Suitability Index rating of 1.0 and are capable of supporting an average of 125 deer per square mile.

Figures 3-70, 3-71 and 3-72 display the interrelationships of all of these variable for areas with wolves. Habitats with the highest value receive a Habitat Suitability Index rating of 1.0 and are capable of supporting an average of 125 deer per square mile.

Human Disturbance and Mortality Factors

Even when they are in hunted populations, Sitka black-tailed deer are very tolerant to human presence. Additional habitat suitability or capability reductions, resulting from human development and associated disturbance or displacement, have not been identified.

Viable Populations

To maintain populations "well distributed" within the deers' occupied range on the islands, Alaska Department of Fish and Game "wildlife analysis areas" were identified as geographic units that would recognize and take into account the distribution and dispersal of deer among the islands of Southeast Alaska. Within each of these wildlife analysis areas, maintain habitat to support 500 animals to achieve a well distributed population and to maintain population viability within the planning area (reference Interagency meeting records of September 26, 1988 and January 6, 1989).

On the mainland, deer populations are lower and are more susceptible to severe winter weather conditions and predation. Some mainland areas do not have viable populations. Four mainland areas have viable populations of deer. These are FORPLAN geozones S08, S09, K05 and K12. To achieve a well distributed population and to maintain population viability, maintain habitat to support 500 deer in each of geozones S08 and S09, and 1,500 deer in geozones K05 and K12 combined (reference Interagency meeting records of September 26, 1988 and January 6, 1989) (Table 3-162).

FIGURE 3-66

EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT SITKA BLACK-TAILED DEER ON LARGER ISLANDS AND THE MAINLAND WITH RESIDENT WOLF POPULATIONS. Source: Suring et al. 1988; letter dated October 12, 1989.

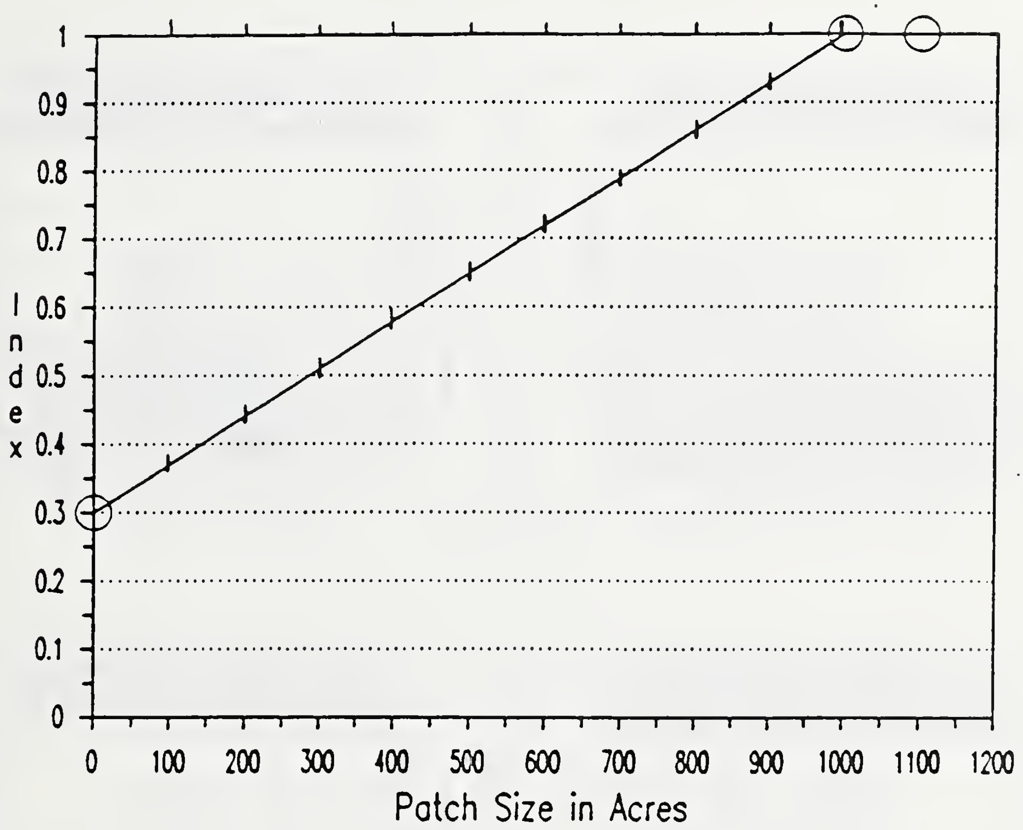


FIGURE 3-67

WINTER HABITAT SUITABILITY FOR SITKA BLACK-TAILED DEER IN SOUTHEAST ALASKA, WITH NO WOLVES AND LOW SNOW CONDITIONS, BY ASPECT, ELEVATION AND CONIFER SUCCESSIONAL STAGE. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce standa; H= productive old-growth hemlock stands; RS= old-growth riparian spruce stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988

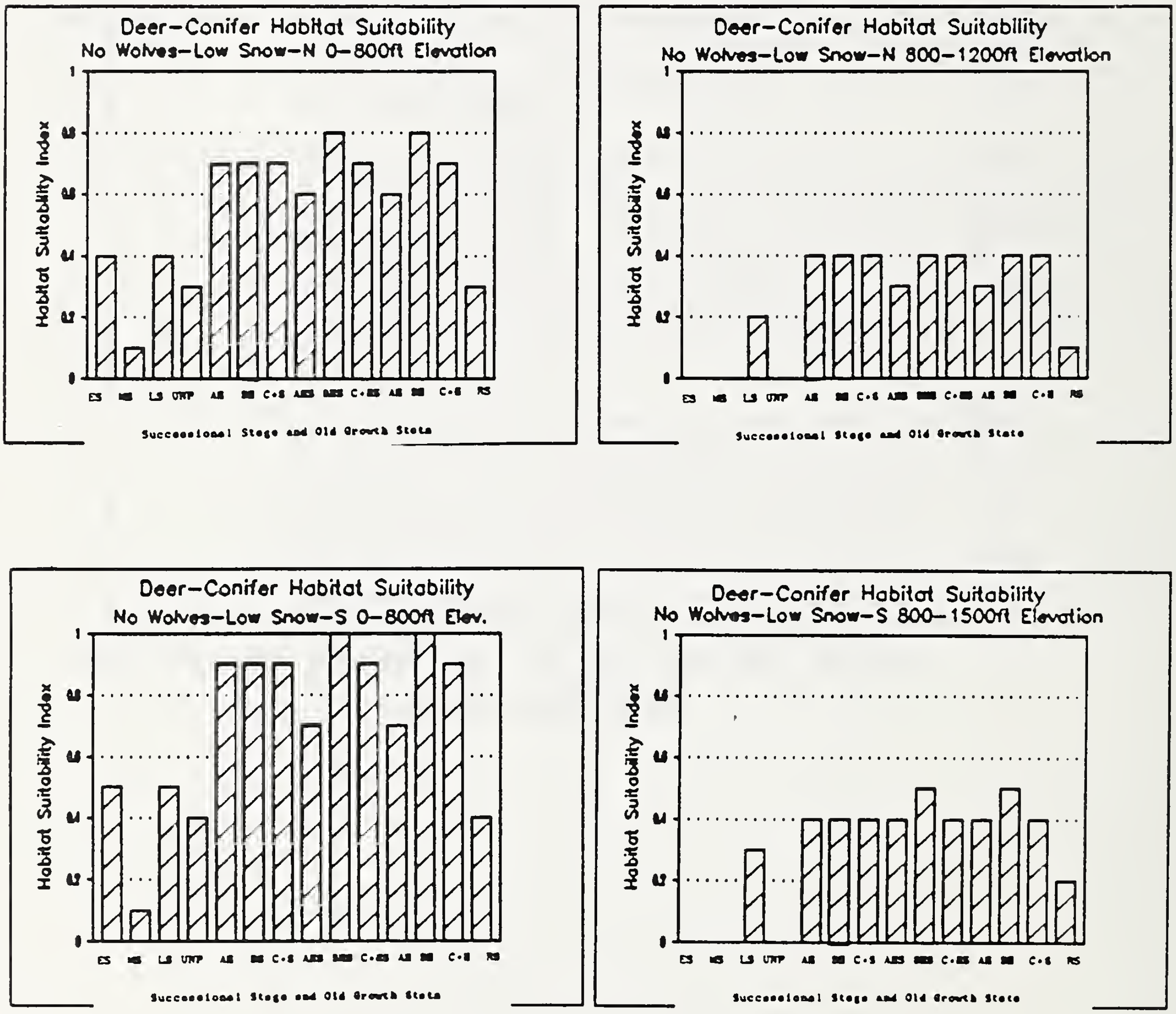


FIGURE 3-68
WINTER HABITAT SUITABILITY FOR SITKA BLACK-TAILED DEER IN SOUTHEAST ALASKA, WITH NO WOLVES AND MODERATE SNOW CONDITIONS, BY ASPECT, ELEVATION AND CONIFER SUCCESSIONAL STAGE. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; RS= old-growth riparian spruce stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988

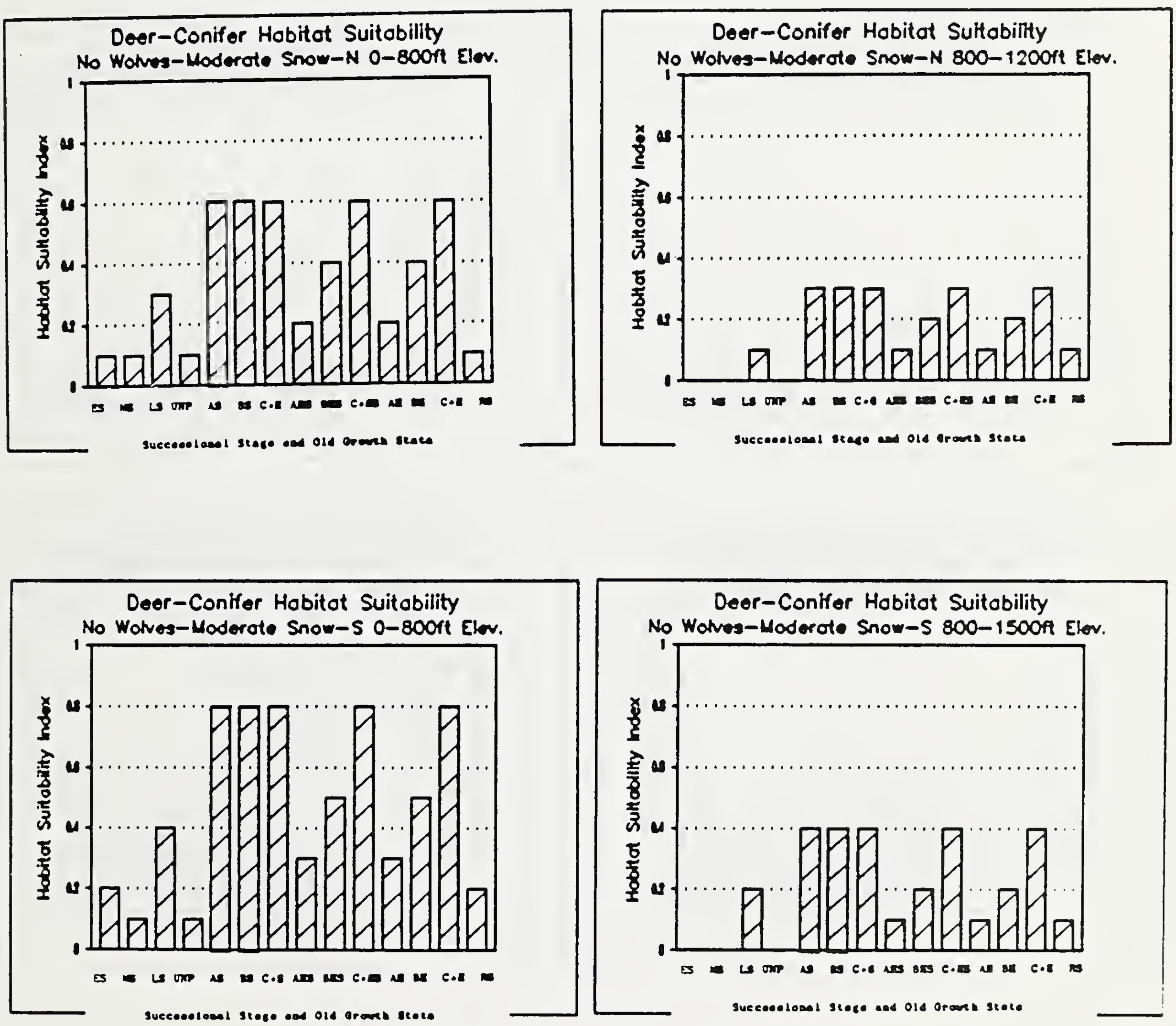


FIGURE 3-69
WINTER HABITAT SUITABILITY FOR SITKA BLACK-TAILED DEER IN SOUTHEAST ALASKA, WITH NO WOLVES AND DEEP SNOW CONDITIONS, BY ASPECT, ELEVATION AND CONIFER SUCCESSIONAL STAGE. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; RS= old-growth riparian spruce stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988

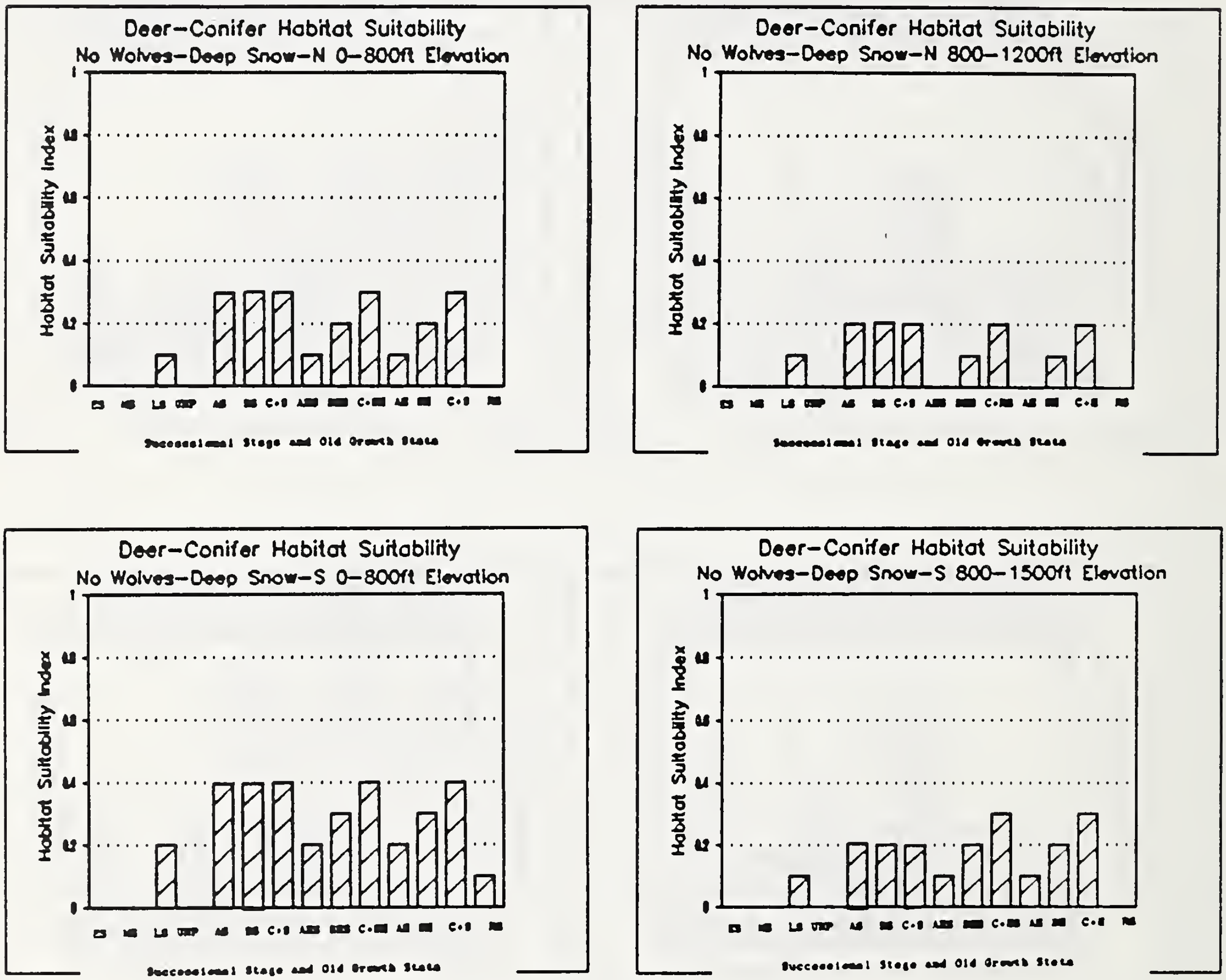


FIGURE 3-70

WINTER HABITAT SUITABILITY FOR SITKA BLACK-TAILED DEER IN SOUTHEAST ALASKA, WITH WOLVES AND LOW SNOW CONDITIONS, BY ASPECT, ELEVATION AND CONIFER SUCCESSIONAL STAGE. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; RS= old-growth riparian spruce stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988

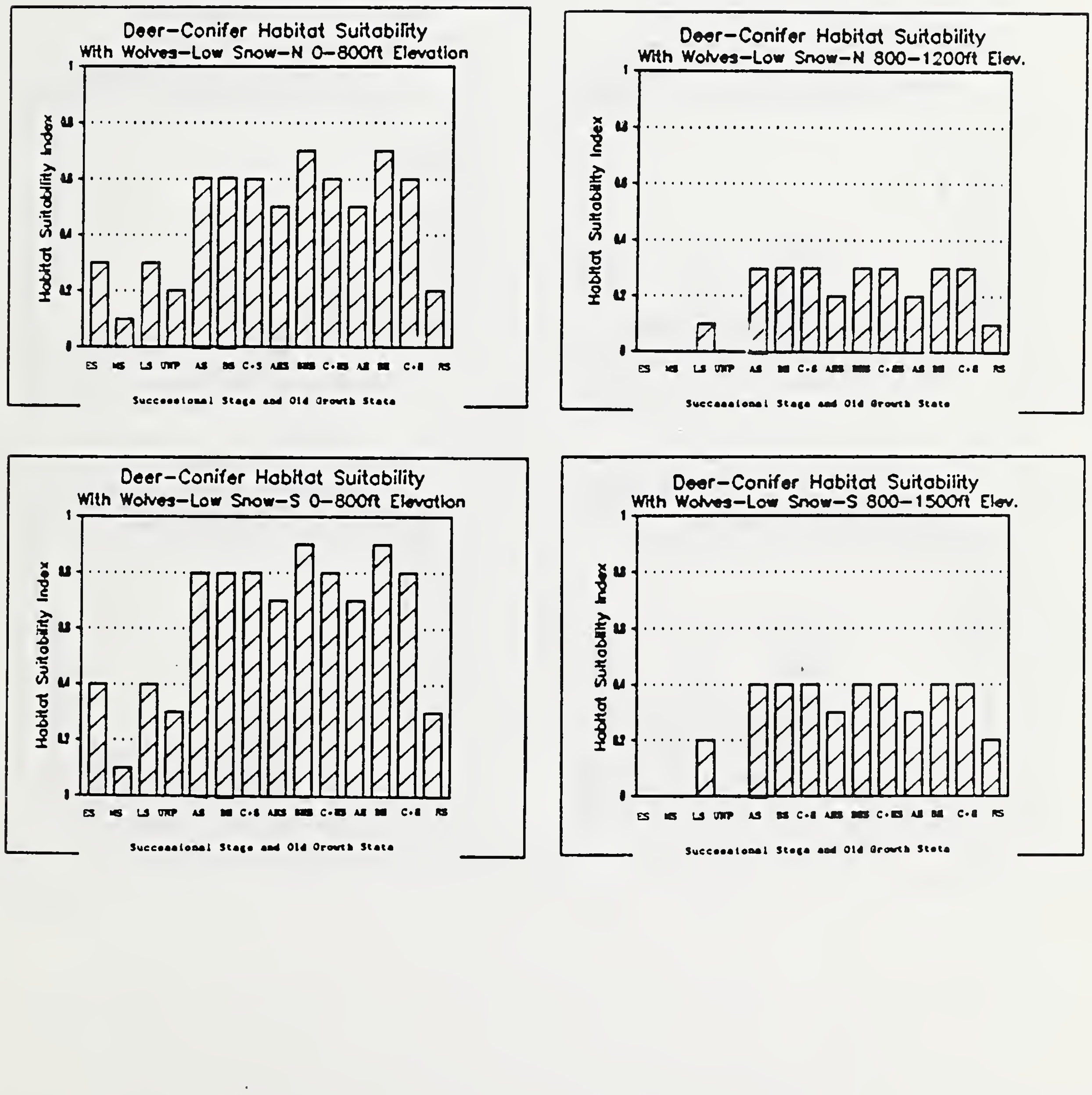


FIGURE 3-71
WINTER HABITAT SUITABILITY FOR SITKA BLACK-TAILED DEER IN SOUTHEAST ALASKA, WITH WOLVES AND MODERATE SNOW CONDITIONS, BY ASPECT, ELEVATION AND CONIFER SUCCESSIONAL STAGE. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; RS= old-growth riparian spruce stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988

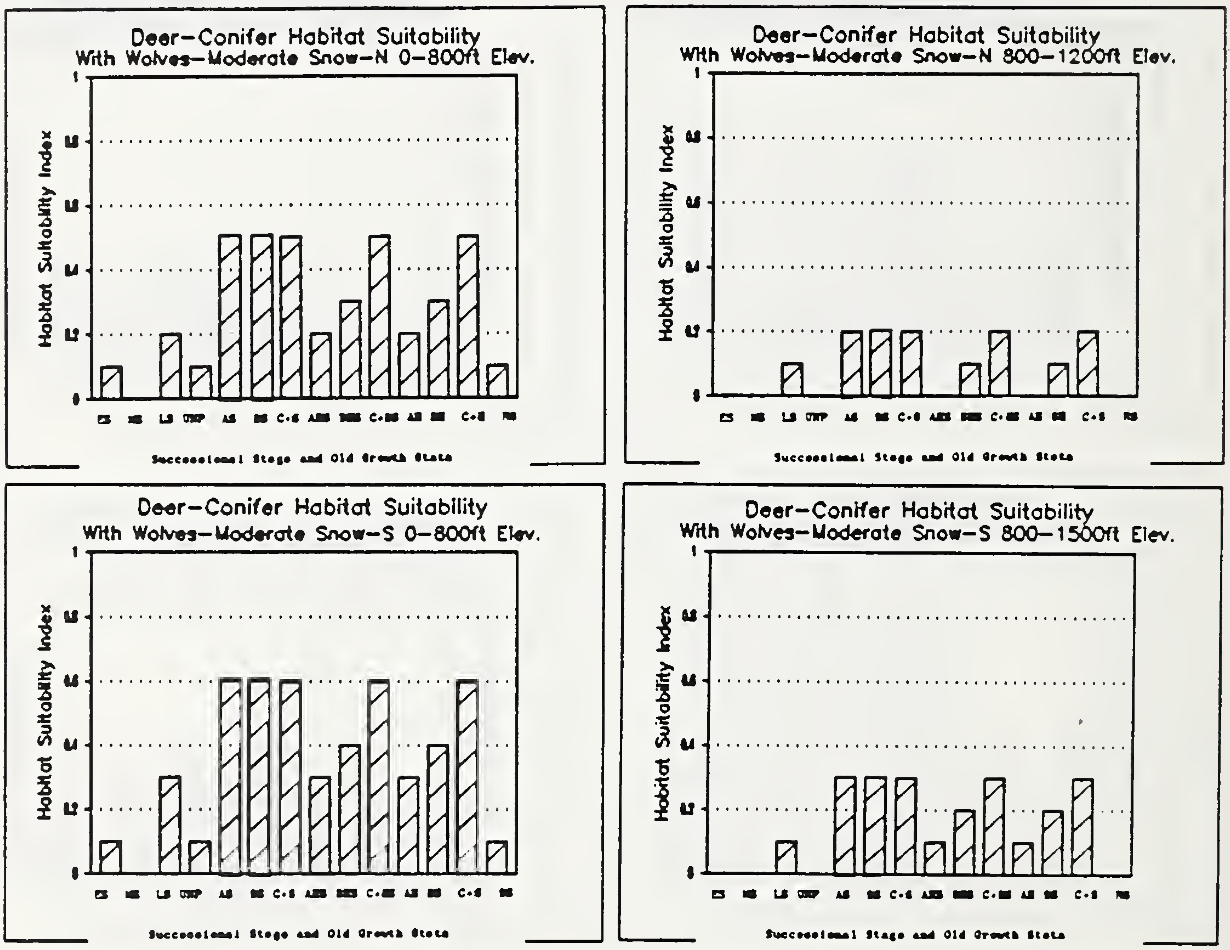


FIGURE 3-72
WINTER HABITAT SUITABILITY FOR SITKA BLACK-TAILED DEER IN SOUTHEAST ALASKA, WITH WOLVES AND DEEP SNOW CONDITIONS, BY ASPECT, ELEVATION AND CONIFER SUCCESSIONAL STAGE. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; RS= old-growth riparian spruce stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988

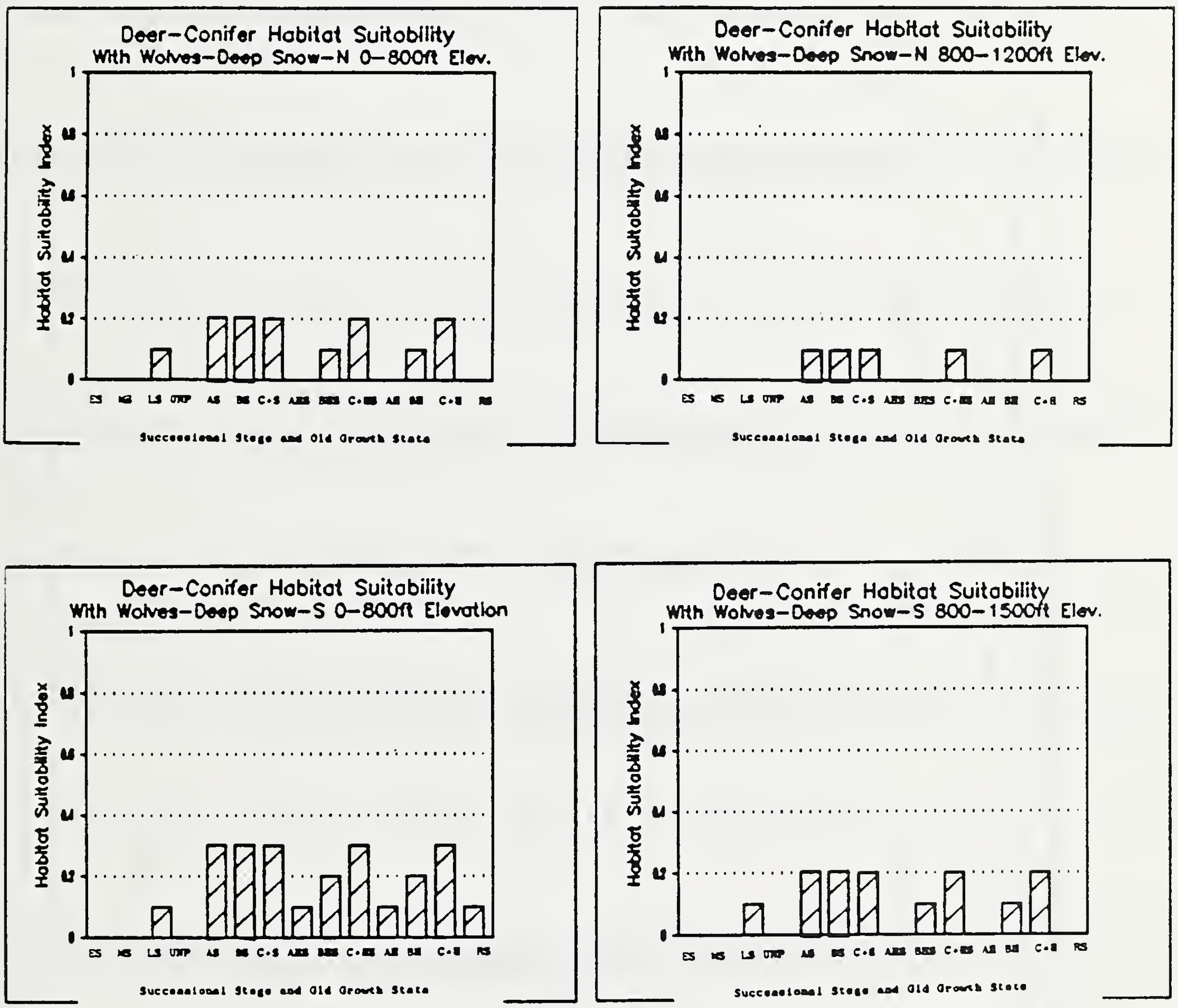


TABLE 3.XX

SNOW DEPTH RATING FOR EACH VALUE COMPARISON UNIT (VCU). (Snow ratings are: 1= low snow conditions; 2= moderate snow conditions; 3= deep snow conditions; 4= extreme snow conditions) Source: Alaska Department of Fish and Game, letters dated 19 August 1988 and 13 February 1989.

USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating
1	4	51	4	100	4	150	2	200	2	250	3
2	4	52	3	101	4	151	3	201	2	251	3
3	4	53	4	102	4	152	3	202	2	252	3
4	4	54	3	103	4	153	2	203	2	253	2
5	4	55	4	104	4	154	3	204	2	254	2
6	4	56	4	105	4	155	3	205	2	255	1
7	4	57	4	106	4	156	3	206	2	256	2
8	4	58	4	107	4	157	3	207	2	257	2
9	4	59	4	108	4	158	2	208	2	258	2
10	4	60	4	109	4	159	2	209	2	259	3
11	4	61	4	110	4	160	2	210	2	260	3
12	4	62	4	111	4	161	2	211	2	261	3
13	4	63	4	112	4	162	2	212	2	262	3
14	4	64	4	113	4	163	2	213	2	263	3
15	4	65	4	114	4	164	2	214	2	264	2
16	3	66	4	115	3	165	2	215	2	265	2
17	3	67	4	116	4	166	2	216	3	266	2
18	4	68	3	117	3	167	3	217	2	267	1
19	4	69	3	118	4	168	2	218	2	268	1
20	3	70	3	119	4	169	2	219	2	269	1
21	4	71	4	120	3	170	2	220	2	270	1
22	4	72	4	121	4	171	2	221	2	271	1
23	3	73	3	122	4	172	2	222	2	272	2
24	3	74	3	123	4	173	2	223	2	273	2
25	3	75	3	124	2	174	2	224	3	274	2
26	[illegible]	76	4	125	2	175	2	225	3	275	2
27	2	77	4	126	2	176	2	226	3	276	3
28	4	78	4	127	2	177	2	227	3	277	2
29	4	79	4	128	2	178	2	228	3	278	2
30	4	80	3	129	2	179	2	229	3	279	2
31	4	81	3	130	2	180	2	230	2	280	3
32	2	82	3	131	2	181	2	231	2	281	3
33	2	83	3	132	2	182	2	232	2	282	3
34	2	84	4	133	2	183	2	233	2	283	3
35	2	85	3	134	2	184	2	234	2	284	3
36	2	86	2	135	2	185	2	235	2	285	3
37	2	87	2	136	2	186	2	236	2	286	2
38	2	88	2	137	2	187	2	237	2	287	2
39	4	89	2	138	2	188	2	238	2	288	2
40	4	90	2	139	2	189	3	239	2	289	2
41	4	91	4	140	2	190	3	240	2	290	2
42	4	92	4	141	2	191	2	241	2	291	2
43	4	93	2	142	2	192	2	242	2	292	2
44	4	94	2	143	3	193	2	243	2	293	2
45	4	95	4	144	3	194	2	244	2	294	2
46	4	96	4	145	3	195	2	245	2	295	2
47	4	97	4	146	2	196	2	246	2	296	3
48	4	98	4	147	2	197	2	247	2	297	2
49	4	99	4	148	2	198	2	248	3	298	3
50	4			149	2	199	2	249	3	299	2

TABLE 3.XX

SNOW DEPTH RATING FOR EACH VALUE COMPARISON UNIT (VCU). (Snow ratings are: 1= low snow conditions; 2= moderate snow conditions; 3= deep snow conditions; 4= extreme snow conditions)

USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating
300	2	350	3	402	2	451	2	501	2	550	2
301	2	351	1	403	2	452	2	502	3	551	2
302	2	352	4	404	2	453	2	503	3	552	2
303	2	353	4	405	2	454	2	504	2	553	2
304	2	354	4	406	1	455	2	505	2	554 1	2
305	1	355	4	407	2	456	2	506	4	554 2	2
306	1	356	4	408	1	457	2	507	4	555	1
307	1	357	4	409	1	458	2	508	3	556	1
308	1	358	4	410	1	459	2	509	2	557	1
309	2	359	4	411	1	460	1	510	3	558	1
310	2	360	4	412	1	461	2	511	3	559	1
311	2	361	4	413	1	462	2	512	3	560	1
312	2	362	4	414	1	463	2	513	4	561	1
313	2	363	4	415	1	464	2	514	3	562	1
314	3	364	4	416	1	465	2	515	4	563	1
315	3	365	4	417	2	466	1	516	4	564	1
316	3	366	4	418	2	467	2	517	3	565	1
317	3	367	4	419	2	468	2	518	3	566	1
318	3	368	4	420	2	469	2	519	3	567	1
319	3	369	4	421	2	470	2	520	3	568	1
320	2	370	4	422	2	471	2	521	3	569	1
321	2	371	4	423	2	472	1	522	3	570	1
322	3	372	4	424	2	473	1	523	2	571	1
323	3	373	4	425	2	474	2	524	2	572	1
324	3	374	4	426	3	475	2	525	2	573	2
325	3	375	4	427	2	476	2	526	2	574	2
326	3	376	4	427 1	2	477	2	527	1	575	2
327	3	377	4	428	2	478	2	528	1	576	2
328	3	378	4	429	2	479	2	529	2	577	2
329	3	379	4	430	2	480	2	530	2	578	2
330	3	380	4	431	1	481	4	531	1	579	2
331	3	381	4	432	2	482	3	532	2	580	2
332	3	382	4	433	1	483	2	533	3	581	2
333	3	383	4	434	2	484	2	534	3	582	2
334	3	384	4	435	2	485	3	534 1	2	583	2
335	3	385	4	436	3	486	3	535	2	584	2
336	3	386	4	437	2	487	3	536	2	585	1
337	3	387	4	438	3	488	4	537	2	586	1
338	2	388	4	439	2	489	2	538	2	587	1
339	2	389	4	440	3	490	2	539	2	588	2
340	2	390	4	441	3	491	4	540	2	589	2
341	2	391	4	442	2	492	2	541	2	590	3
342	2	392	4	443	2	493	3	542	2	591	1
343	2	393	4	444	3	494	4	543	1	592	1
344	3	394	4	445	3	495	3	544	1	593	1
345	2	395	4	446	2	496	2	545	1	594	1
346	3	398	2	447	2	497	2	546	1	595	2
347	3	399	2	448	2	498	4	547	1	596	2
348	3	400	2	449	2	499	4	548	1	597	2
349	2	401	2	450	2	500	4	549	2	598	2

TABLE 3.XX

SNOW DEPTH RATING FOR EACH VALUE COMPARISON UNIT (VCU). (Snow ratings are: 1= low snow conditions; 2= moderate snow conditions; 3= deep snow conditions; 4= extreme snow conditions)

USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating	USFS VCU no.	Snowpack rating
599	1	649	1	697	1	747	2	797	4	847	4
600	1	650	1	698	2	748	2	798	4	848	4
601	1	651	1	699	1	749	1	799	4	849	4
602	1	652	1	700	1	750	1	800	3	850	4
603	1	653	1	701	1	751	1	801	4	851	4
604	1	654	1	702	1	752	1	802	4	852	4
605	2	655	1	703	1	753	2	803	4	853	4
606	3	656	1	704	1	754	2	804	4	854	3
607	2	657	1	705	1	755	2	805	4	855	3
608	3	658	1	706	1	756	2	806	4	856	4
609	2	659	1	707	1	757	2	807	4	857	3
610	2	660	1	708	1	758	1	808	4	858	2 3
611	2	661	1	709	2	759	1	809	4	859	2
612	2	662	1	710	2	760	1	810	4	860	2
613	2	663	1	711	1	761	1	811	4	861	1
614	2	664	1	712	1	762	1	812	4	862	2
615	1	665	1	713	1	763	1	813	4	863	1
616	1	666	1	714	1	764	1	814	4	864 1	2
617	1	667	1	715	2	765	1	815	4	864	2
618	2	668	1	716	2	766	1	816	4	865	1
619	2	669	1	717	2	767	1	817	4	866	1
620	2	670	1	718	3	768	1	818	3	867	4
621	2	671	1	719	2	769	2	819	3		
622	2	672	1	720	2	770	2	820	3		
623	1	673 1	1	721	2	771	2	821	3		
624	2	673	2	722	2	772	2	822	3		
625	1	673 2	1	723	2	773	3	823	3		
626	1	674	2	724	3	774	3	824	2		
627	1	675	2	725	3	775	3	825	3		
628	1	676	1	726	3	776	3	826	3		
629	1	677	2	727	3	777	3	827	3		
630	1	678	2	728	3	778	3	828	3		
631	1	679	1	729	3	779	3	829	2		
632	1	680	1	730	3	780	3	830	2		
633	1	681	1	731	3	781	3	831	1		
634	1	682	2	732	3	782	3	832	2		
635	1	683	2	733	3	783	4	833	3		
636	1	684	2	734	3	784	4	834	3		
637	1	685	1	735	2	785	4	835	4		
638	1	686	3	736	2	786	4	836	3		
639	1	687	2	737	3	787	4	837	4		
640	1	688	1	738	2	788	4	838	4		
641	1	689	1	739	3	789	4	839	4		
642	1	690	1	740	2	790	4	840	4		
643	1	691	2	741	2	791	3	841	4		
644	1	692	2	742	3	792	3	842	4		
645	1	693	2	743	2	793	3	843	4		
646	1	694	1	744	3	794	4	844	4		
647	1	695	1	745	3	795	4	845	4		
648	1	696	1	746	2	796	4	846	4		

RIVER OTTER

Distribution

River otters are associated with aquatic environments (both coastal and fresh water) and the immediately adjacent (within 100-500 feet) upland habitats throughout Southeast Alaska. Their distribution is Forest-wide in suitable habitats.

Literature Review

Habitat selection by river otters along the coastline in Southeast Alaska appears to be related to the availability of food resources and adequate cover (Larsen 1983; Woolington 1984). Due to their variety and abundance of food, coastal habitats are especially productive for otter (Larsen 1984; Stenson et al. 1984). Beaches characterized by convex shorelines, short intertidal lengths, and the presence of bedrock substrate were selected by otters in response to presence and availability of prey. Cottids, Scorpaenids, and Hexagrammids occurred most frequently in otter diets in Southeast Alaska (Larsen 1984). These fish often occur in intertidal areas with fairly steep beaches which are often located adjacent to convex shorelines (Hart 1973).

Although beach characteristics affected river otter use of habitats, otters did not utilize beaches which had preferred foraging characteristics when these areas were adjacent to clearcuts (Larsen 1983). Five to 20 year-old clearcuts were used less than expected by river otters, while forested habitats were used in proportion to availability. Clearcuts were apparently used less due to dense shrub growth, extensive slash, and lack of an overstory canopy. River otters in Southeast Alaska tended to select areas with canopy closure greater than 20 percent that were free from extensive vegetative debris and dense shrub growth.

River otters in Southeast Alaska made extensive use of natural cavities within 75 feet of the beach as daytime resting sites (Larsen 1983). Cavities under snags were used as burrows more often than any other structures. The mean diameter at breast height of all trees and snags associated with cavities used as burrows was 34 inches.

During much of the year, the majority of river otter activity occurs within 100 feet of the coastline (Larsen 1983; Woolington 1984). From May through July female river otters may use inland riparian habitats generally within 0.5 miles of the coastline as natal denning sites (Woolington 1984). Old-growth forests, on well-drained soils, adjacent to streams, up to 800 feet elevation are considered optimum natal denning habitat for river otters. Woolington (1984) found river otter natal dens between 0.15 and 0.5 miles inland from saltwater in well-drained riparian habitats or areas within 100 feet of them. Stream courses were used as travel corridors between natal dens and foraging areas on the coastline.

A proportion of river otters periodically move into inland stream and lake riparian habitats (Home 1982; Larsen 1983; Woolington 1984). Otters apparently travel extensively throughout stream and lake systems using areas with greatest food availability (Melquist and Hornocker 1983). Streams in Southeast Alaska support populations of sculpins (Cottus spp.) which are the preferred food item of river otters in this area (McLarney 1968, Mason and Machidori 1975, Larsen 1984).

Habitat Suitability and Capability

The literature cited indicates that food availability and adequate cover are two factors which affect an area's use by otter. Food availability along the coast was not a resource element within the Forest GIS database. Therefore, cover attributes are the only habitat parameter available for measuring habitat quantity and quality along the coast. A river otter spring habitat capability

model was developed by an interagency task group, and is described by Suring, et al. (1988). [NOTE: The season of the year and the habitat factors which are most limiting to river otters have not been identified. There is also a lack of food resource information along the coast. The model outputs must be viewed with caution until more knowledge is obtained on the factors which currently limit river otters in Southeast Alaska.]

The model identifies the following variables in describing the value of spring habitats:

Location/Elevation. Suitable habitat occurs along the coast or beach fringe (defined as 500 feet above mean high tide); and within riparian habitats along rivers, streams and lakes up to 1,200 feet elevation. For riparian habitats, 0-800 feet elevation has higher value as habitat than 800-1,200 feet elevation.

Vegetation. The successional stage of the forest vegetation influences the quality of habitat. Old-growth forests have the highest value because they provide canopy cover, large diameter trees and snags, and availability of burrow and den sites. Younger successional stages provide lower quality habitat. Non-forested habitats have no value for river otter.

Fish Abundance. Streams and rivers that produce anadromous and resident fish have higher value as habitat for river otters; streams and rivers with no fish have no value as habitat.

Lake Size. Lakes greater than 50 acres in size provide more forage opportunities than smaller lakes, and therefore have higher habitat value.

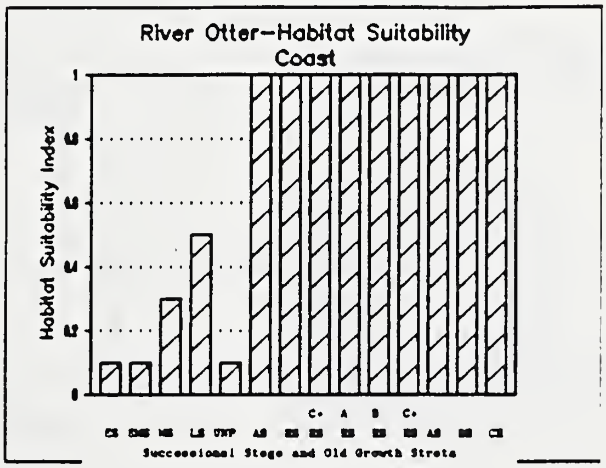
Patch Size and Corridors. River otter habitat use occurs in a "linear" pattern along the coast and along riparian habitats. They have not been identified as a species requiring minimum patch sizes. Similarly, they do not have specific vegetative corridor requirements, as they travel along the coast and riparian areas through a variety of terrain and vegetative conditions (ref. July 31 and August 1, 1989 Interagency workshop).

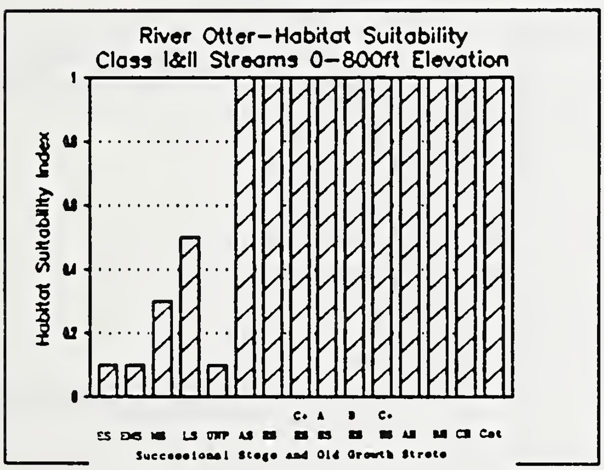
Figures 3-73 and 3-74 display the interrelationships of all of these variables in evaluating the suitability and capability of habitats for river otters. Habitats with the highest value receive a Habitat Suitability Index rating of 1.0, and are capable of supporting an average of 6 otters per square mile of habitat.

Human Disturbance and Mortality Factors

Often observed around boat harbors and other developments along the coast, river otters are very tolerant of human presence. Melquist and Dronkert (1987) have reviewed human activities which cause river otter mortality: roadkills, drowning in gill nets, accidental trapping or trapping incidental to beaver harvest, legal trapping, and unscrupulous hunters. The Alaska Department of Fish and Game has primary responsibility to regulate harvest to maintain viable populations when suitable habitat exists. Additional habitat suitability or capability reductions resulting from human disturbance or access have not been documented or developed for the river otter habitat capability model.

FIGURE 3-73
SPRING HABITAT SUITABILITY FOR RIVER OTTER IN SOUTHEAST ALASKA IN COASTAL (BEACH FRINGE) HABITATS AND STREAM/RIVER HABITATS. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; EMS= early middle successional stage, 25-70 years; MS= middle successional stage, 70-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; COT= cottonwood habitats; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988





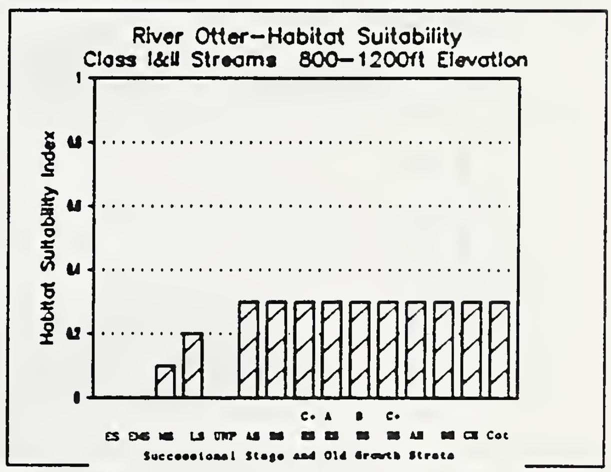
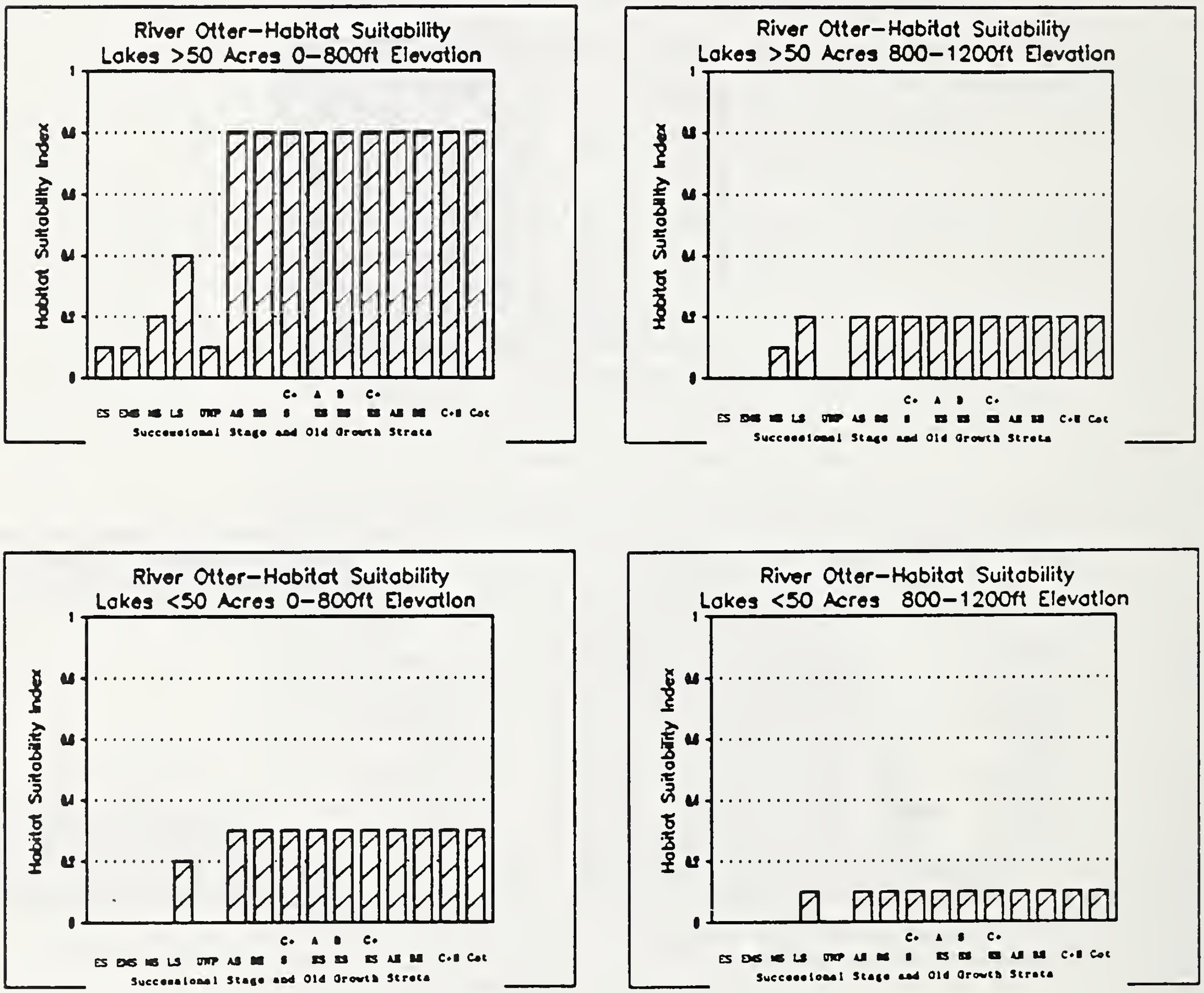


FIGURE 3-74
SPRING HABITAT SUITABILITY FOR RIVER OTTER IN SOUTHEAST ALASKA IN LAKE HABITATS. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; EMS= early middle successional stage, 25-70 years; MS= middle successional stage, 70-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; COT= cottonwood habitats; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988



Viable Populations

Melquist and Dronkert (1987) reviewed literature on river otter densities in North America, and reported a range of densities from one otter per 0.7 miles of coastline, to one otter per 3.6 miles of waterway, to one otter per 262 acres of coastal marsh (this last figure equates to 1 otter per 4.4 miles of coastline habitat in Southeast Alaska). Research in Southeast Alaska indicates that all river otters use coastal habitats at sometime during the year, with a portion of the populations using freshwater habitat during various seasons of the year. To achieve a well distributed population and to maintain population viability within the planning area, maintain habitat to support at least one otter per 4.4 miles of coastline within each FORPLAN geozone.

MARTEN

Distribution

Historically, marten have inhabited only the mainland of Southeast Alaska. They have never dispersed naturally from the mainland to the islands. Through cooperative transplant work between the Alaska Department of Fish and Game and the Forest Service, marten are now present on many of the islands. At the present time, marten are not found within the following Value Comparison Units (VCU's): 33-37, 93, 94, 124, 185, 186, 368, 455-461, 481, 507, 525, 629, 865.

Literature Review

The availability of cover and the presence of both their prey species determine marten distribution and abundance (Simon 1980). A number of studies describe canopy cover as a critical component of marten habitat.

Numerous studies have shown that clearcutting is detrimental to marten populations (de Vos 1951, 1952; Steventon and Major 1982; Snyder and Bissonette 1987). Soutiere (1979) found that clearcutting lowers the carrying capacity of an area for marten, eliminating resting sites, winter hunting sites, overhead cover and preferred prey species. The result of clearcutting is that marten require larger home range sizes; their population densities are lowered. Red-backed voles, the staple food source of martens, are abundant in undisturbed forests. Since these voles avoid forest openings, they are rare or absent for at least 10 years following clearcutting (Miller and Getz 1972; Powell 1972; Martell and Radvaryi 1977; Campbell 1979). Red squirrels, another marten prey species, appear to follow similar trends (Wolff and Zasada 1975; Medin 1986). Small mammal populations not preferred by marten, such as deer mice, generally increase in clearcut areas (Tevis 1956; Campbell 1979; Van Horne 1981).

Second-growth stands are even less preferable as marten habitat. Dense overstories in second-growth stands tend to develop at age 25 and persist until the end of the rotation when the amount of light that reaches the forest floor decreases, depleting the understory vegetation which provides habitat for the marten's primary prey species. Lower prey populations in second-growth stands result in significantly lower marten populations (de Vos 1952; Koehler et al 1975).

Marten prefer habitats with tree canopies, apparently for predator avoidance and other survival benefits. The minimum canopy closure suitable for marten is about 30 percent (Koehler and Hornocker 1977). Optimum canopy closure ranges from 60 to 80 percent with a declining value for marten habitat as canopy closure approaches 100 percent (Spencer 1981; Spencer, et al. 1983; Bateman 1986).

Many studies have described the relationship between high quality marten habitat and snags (Simon 1980; Spencer et al. 1983; Wynne and Sherburne 1984; Spencer 1987). Snags that are large diameter, often with broken tops, and sheltered by an overstory canopy are often used by marten as resting and denning sites.

Another important component of marten habitat is dead and down woody material (e.g., Simon 1980; Steventon and Major 1982; Spencer et al 1983; Hargis and McCullough 1984; Spencer 1987). Marten use dead and down material for denning and to gain access to their prey under the snow.

Habitats within 500 feet of the beach (beach fringe) and in riparian areas are high value for marten. Beach fringe habitats more valuable for marten because of marine and aquatic organisms as a food source, undercut banks for dens and burrows, deciduous tree layers, grasses and sedges as habitat for prey species, and increased dead and down material resulting from blowdown.

Winter habitat requirements are most important for the marten. A marten's cover requirements during the winter are more restrictive than cover requirements during other seasons. Availability of the marten's prey may decrease during the winter months, especially with increasing snow depths at higher elevations.

Habitat Suitability and Capability

The quantity and quality of winter habitat is the most limiting factor for marten in Southeast Alaska. Winter habitats are also the habitats most likely to be affected by Forest management activities. A marten winter habitat capability model was developed by an Interagency task group, and is described by Suring, et al. (1988). This model identifies the following variables in describing the value of winter habitats:

Location/Elevation. Habitats at lower elevations have higher value for wintering marten due to lower snow accumulation. Coastal habitats (beach fringe) have the highest value for marten, followed by upland habitats below 800 feet elevation, and habitats between 800 to 1,500 feet elevation. There is no winter habitat value above 1,500 feet elevation. Habitat value for riparian areas and coastal habitats are about equal.

Vegetation. The successional stage of the forest vegetation influences the quantity and quality of cover and forage available for marten during the winter season. Old-growth forests have the highest value because they intercept snow, provide cover and denning sites, and provide habitat for prey species used by marten. Early successional stages do not provide these habitat components and have lower habitat value.

Patch Size and Corridors. Marten have been identified as a species which show a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 180 acres, and use declines with decreasing patch size; it becomes zero when patches are less than 10 acres (Figure 3-75). Patch size includes the acres of all conifer stands from older second growth through old growth. Marten also require corridors to facilitate movement and dispersal. Corridor requirements include all conifer stands from pole timber through old growth (ref. July 31 and August 1, 1989 Interagency workshop).

Figure 3-76 displays the interrelationships of coastal, riparian, elevation and vegetation successional stage in evaluating the suitability and capability of habitats for wintering marten. Habitats with the highest value receive a Habitat Suitability Index rating of 1.0, and are capable of supporting an average of four marten per square mile when patch sizes are greater than 180 acres in size.

Human Disturbance and Mortality Factors

Timber harvest and other resource development activities require the construction of roads. Roads provide additional access for trappers which may result in increased harvests of marten. Marten are easily trapped and can be overharvested especially where trapping pressure is heavy (Strickland et al. 1982). An interagency task group developed a hypothetical curve to display the effect of road density on overharvesting and the ability of habitats to support marten populations (Figure 3-77). This curve was applied to the marten habitat capability data and road density data for Geozone K06; the results from applying the curve resulted in habitat capability being less than the number of marten currently being trapped in that geozone (ref. 16 November 1989 Interagency meeting notes). The curve probably cannot be applied on a geozone-wide basis, and more documentation and analysis is needed to develop the relationship. There is current discussion on whether the potential reduction in marten numbers are due to habitat capability or inadequate harvest regulations which allow overharvesting. The Alaska Department of Fish and Game has primary responsibility to regulate harvest to maintain viable populations when suitable habitat exists.

Viable Populations

To maintain populations "well distributed" within their occupied range on the islands, Alaska Department of Fish and Game "wildlife analysis areas" were identified as geographic units that would recognize and take into account the distribution of marten among the islands of Southeast Alaska. Within each of these wildlife analysis areas, maintain habitat to support 50 animals to achieve a well distributed population and to maintain population viability within the planning area (reference interagency meeting records of September 26, 1988 and January 6, 1989).

FIGURE 3-75
EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT MARTEN.

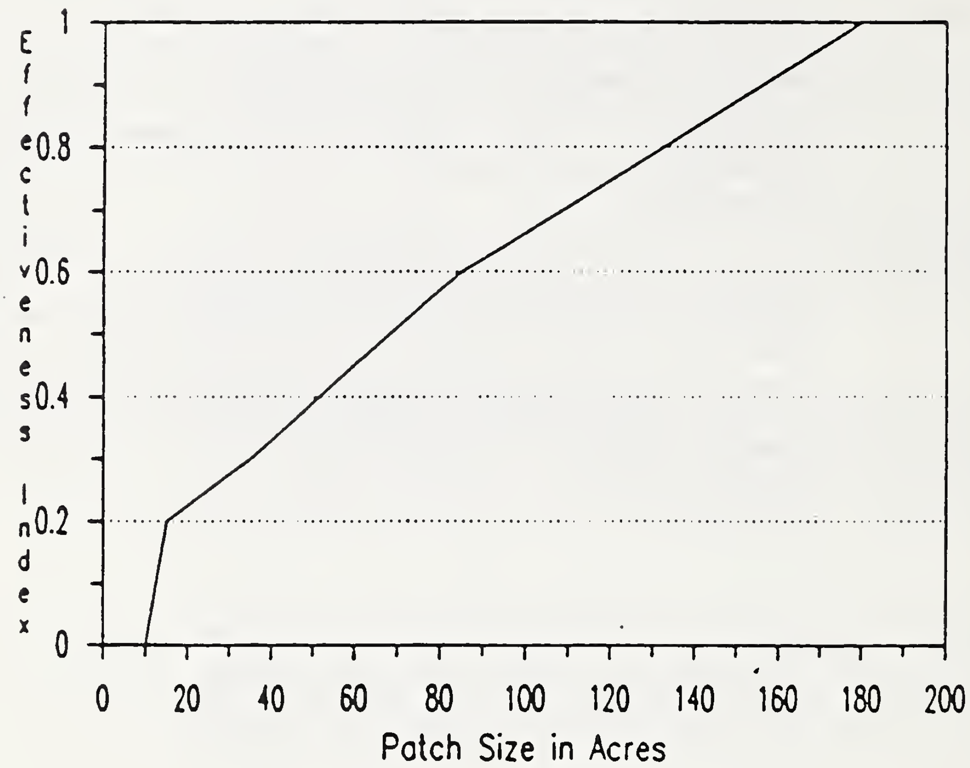


FIGURE 3-76
WINTER HABITAT SUITABILITY FOR MARTEN IN SOUTHEAST ALASKA WITHIN COASTAL, RIPARIAN, AND UPLAND HABITATS, BY FOREST SUCCESSIONAL STAGE. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988

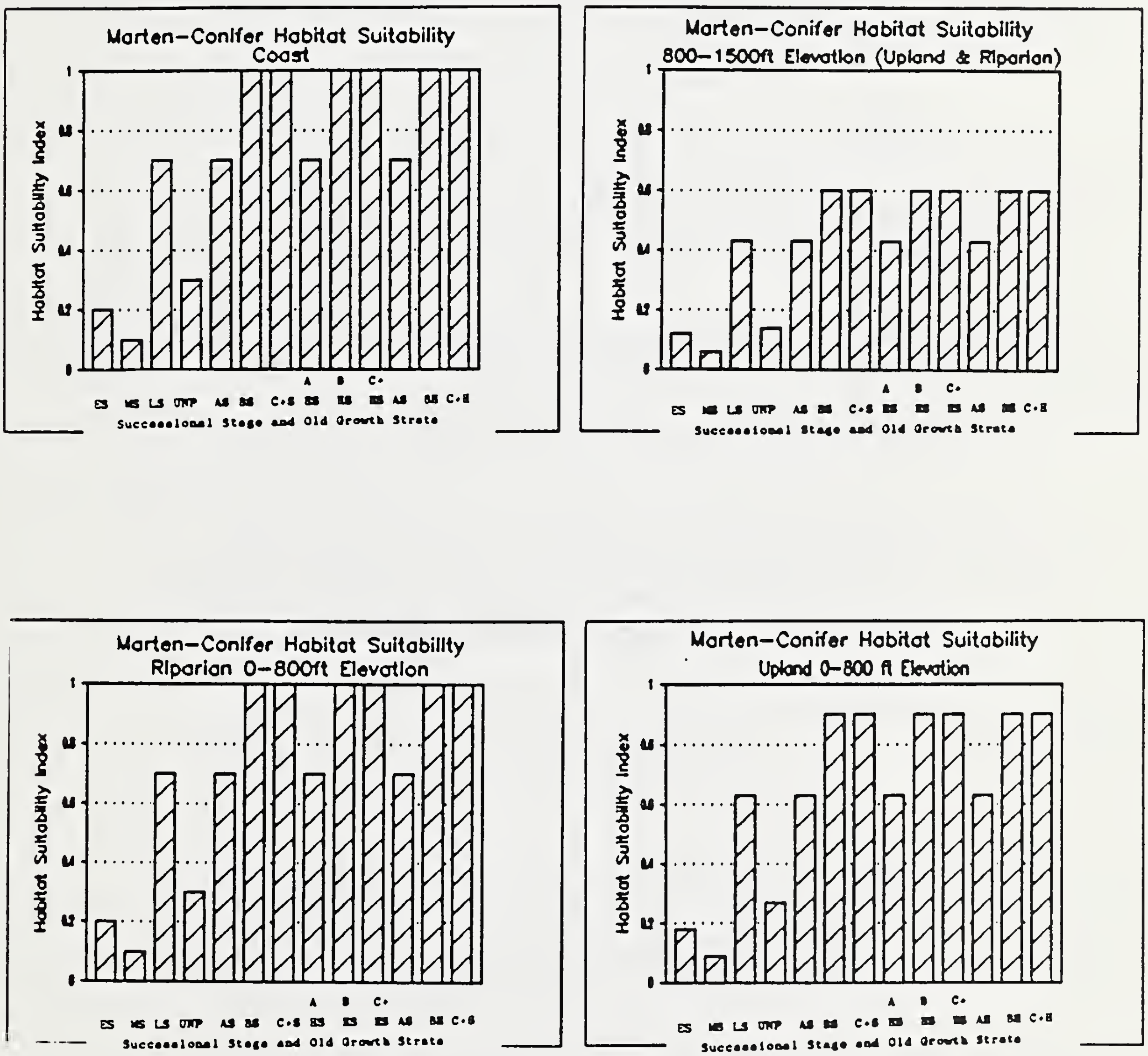
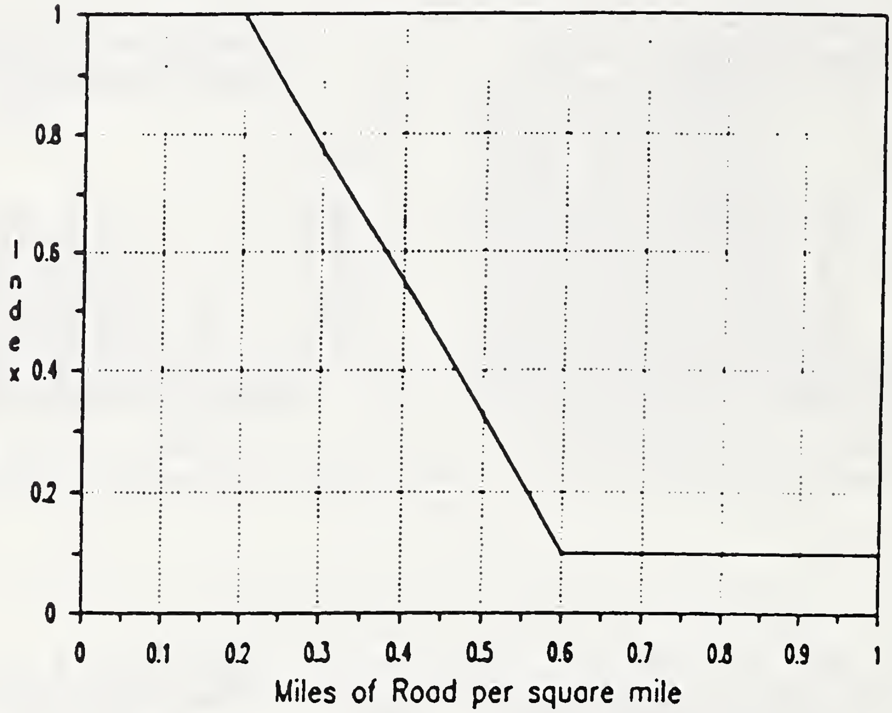


FIGURE 3-77

HYPOTHETICAL EFFECT OF ROAD DENSITY ON THE CAPABILITY OF HABITATS TO SUPPORT MARTEN WITHOUT ADEQUATE SAFEGUARDS TO PREVENT OVERHARVESTING



BROWN BEAR

Distribution

Although considered the same species, Ursus arctos horribilis, is referred to as brown bear in coastal Alaska and grizzly bear in interior areas and the remainder of North America. Records indicate that the current and historical distribution of brown bear in Southeast Alaska are the same. Brown bears are present on the mainland and on the islands north of Frederick Sound. South of Frederick Sound, they are occasionally reported on Mitkof and Wrangell Islands, but are not found on any of the other islands. The populations on Mitkof and Wrangell islands are not considered to be viable. Brown bear are not present in the following Value Comparison Units (VCU's): 22, 33-37, 68-92, 398-477, 479, 525, 527-707, 731-781, 864, 865, 866.

Literature Review

The largest population of brown bears in North American today is in Alaska (Peck et al. 1987). This is estimated at 30,000 to 40,000 bears (Alaska Department of Fish and Game 1978). The northern islands of Admiralty, Baranof, and Chichagof have some of the highest brown bear densities in the world--one per square mile on northern Admiralty (Schoen and Beier 1988).

Brown bears are one of the unique features of the Tongass National Forest. Alaska Fish and Game Game Management Unit 4, which includes Admiralty, Baranof and Chichagof Islands, is one of the most important brown bear hunting regions in the state, ranking third behind the Alaska Peninsula and the Kodiak Archipelago with an average of 83 bears harvested annually since 1980 (unpublished data, ADF&G).

Brown bears begin emerging from high elevation (above 1,000 feet) dens during April and May. After den emergence, many bears move to low-elevation, old-growth forests, coastal sedge meadows, and south-facing avalanche slopes. During early summer (mid-June through mid-July), most bears move up to forested slopes and alpine/subalpine meadows where they forage on newly-emergent vegetation.

Between mid-July and early September, bears concentrate along low-elevation coastal salmon streams. During this period, 61 percent of radio-collared bears were found within a tenth of a mile of these streams and 39 percent of bear locations within that tenth of a mile occurred in riparian old-growth Sitka spruce/Devil's club habitat (Schoen and Beier, unpublished data).

Though most bears are associated with anadromous fish streams in late summer, some bears (primarily females) do not use coastal fish streams (Schoen et al. 1986). By mid-September, most bears begin moving toward upper elevation forests, avalanche slopes, and subalpine meadows where they feed on currant (Ribes spp) and devil's club berries before denning.

Winter denning begins in October and November. Mean elevation and slope of 121 den sites of radio-collared bears from Admiralty and Chichagof Islands were 2,100 feet (640 meters) and 35 degrees (Schoen et al. 1987a). Fifty-two percent of those dens occurred in old-growth forest habitat. Though cave denning was common on Admiralty Island, many dens were excavated under large-diameter old-growth trees or into the bases of large snags (Schoen et al. 1987a).

McCarthy (1989) described the seasonal food habitats of brown bear. During spring, their diet is dominated by sedges (Carex spp.), other green vegetation, roots, and deer. Sedges and salmon (Oncorhynchus spp.) are the major food items consumed during summer although skunk cabbage (Lysichitum americanum), devil's club berries; and other plants, berries, and roots are also used. During fall,

salmon, devil's club berries, skunk cabbage, sedge, beach lovage roots (Ligusticum spp), and currants dominate their diet.

Clearcut logging and early forest succession produce an abundance of forage plants used by bears (Mealy, et al 1977, Linzey and Meslow 1977, Zager et al. 1983). Theoretically, these sites should provide adequate habitat for brown bear. However, on Chichagof Island, Schoen and Beier (1988) found that only two percent of 866 relocations of radio-collared bears occurred in clearcuts. A possible explanation of this limited use might be that other sites (e.g., alpine/subalpine habitat, wetlands, riparian old growth, avalanche slopes) provided better foraging and cover habitat than clearcuts. Because younger second-growth conifer stands (25 to 150 years old) in Alaska produce minimal understory vegetation, second growth is poor foraging habitat for animals that feed on plants (Wallmo and Schoen 1980; Alaback 1982, 1984).

Although availability of suitable den sites is an important component of brown bear habitat, field experience indicates that it is not limiting in most circumstances and it is unlikely to be substantially impacted by forest management.

Habitat Suitability and Capability

The late summer season has been identified as the most critical or limiting period for brown bear. During this season, the bears concentrate along low-elevation valley bottoms and coastal salmon streams. These are the same areas of highest human use and most intense resource development activities. An interagency task group developed a late summer season habitat capability model for brown bear (Schoen et al. 1989). This model identifies the following variables in describing the value of late summer season habitats:

Location/Elevation. During the late summer season, brown bears use habitats ranging from estuaries and other coastal habitats to riparian, upland and alpine habitats. Estuaries and riparian areas receive the highest use during this period and receive the highest habitat values.

Vegetation. The successional stage of the forest vegetation influences the quantity and quality of forage and cover. Non-forested or non-conifer habitats are also used by brown bears. The vegetation types which receive the highest use by brown bears during the late summer season receive the highest habitat values.

Fish Abundance. Streams and rivers that produce anadromous fish have the highest value for brown bears, while resident fish streams and streams with no fish have lower values.

Patch Size and Corridors. Brown bears have not been identified as a species requiring minimum patch sizes of a particular habitat type. They have large home ranges, utilize a wide variety of habitats with a variety of patch sizes and patterns. Similarly, they do not have specific vegetation corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions (ref. July 31 and August 1, 1989 interagency workshop).

Figures 3-78 and 3-79 display the interrelationships of all of these variables in evaluating the suitability and capability of habitats for brown bear during the late summer season. Habitats with the highest value receive a Habitat Suitability Index rating of 1.0, and support an average of 2.47 brown bears per square mile of habitat.

Human Disturbance and Mortality Factors

Natural resource management and development, which increases human activity in brown bear habitat, is evaluated by human/bear interactions. Often, increases in human activity result in increased direct human-induced mortality of bears. Although it is possible to manage legal hunting of bears, it is difficult to control illegal kills, wounding loss, and defense of life or property kills (Schoen et al. 1987b). Table 3-163 displays the number of known brown bear kills not associated with legal hunting seasons. From 1980 to 1987 a total of 95 kills occurred.

Schoen et al. (1989) estimated the effects of human developments and activity on habitats and populations of brown bear (Table 3-164). As access and development increases human activity into occupied brown bear habitat, there is potential for the quality and capability of the habitat to decline. Additional discussion on the estimated effects in Table 3-164 is presented later in this section in the analysis of existing habitat capability.

Viable Populations

Due to their population densities and large home ranges, maintaining viable populations of brown bear requires large units of land. To maintain brown bear populations well distributed within their occupied range, eight geographic units were identified: Admiralty Island, Chichagof Island, Baranof Island, ADF&G Game Management Units 1A, 1B, 1C, 1D, and 5A (Yakutat). Within each of these geographic units, maintain habitat to support the following populations to maintain population viability within the planning area: Unit 1A - 125; Unit 1B - 125; Units 1C plus 1D - 125; Unit 5A - 250; Admiralty Island - 250; Baranof Island - 250; Chichagof Island 250 (referenco interagency meeting records of September 26, 1988 and January 6, 1989).

FIGURE 3-78

LATE SUMMER HABITAT SUITABILITY FOR BROWN BEARS IN SOUTHEAST ALASKA FOR CONIFER AND NON-CONIFER HABITATS IN ESTUARY FRINGE, COASTAL AND UPLAND AREAS. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; SA= productive subalpine old-growth stands (subalpine is defined as 1500-2000 ft elevation); A= strata class A stands; B= strata class B stands; C+= strata class C & D stands)(Non-forest definitions are as follows: estuary= just the identified estuary area; chutes= all avalanche chutes; alpine= all non-forested vegetation above 2000 ft elevation; other vegetation= all other non-forested vegetation types). Source: Schoen et al. 1989

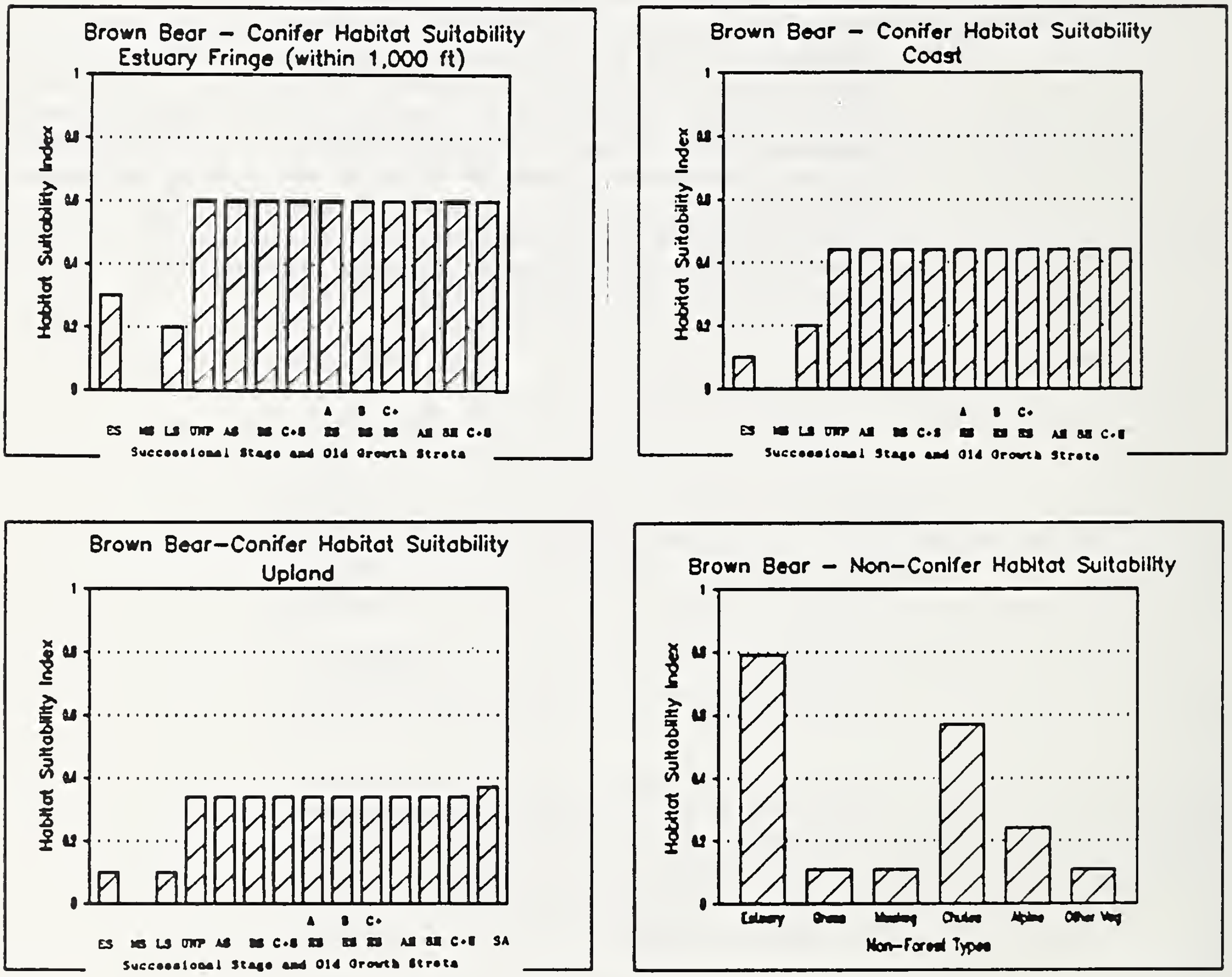


FIGURE 3-79
LATE SUMMER HABITAT SUITABILITY FOR BROWN BEARS IN SOUTHEAST ALASKA FOR HIGH, LOW AND NO FISH ABUNDANCE IN RIPARIAN AREAS. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; SA= productive subalpine old-growth stands (subalpine is defined as 1500-2000 ft elevation); A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Schoen et al. 1989

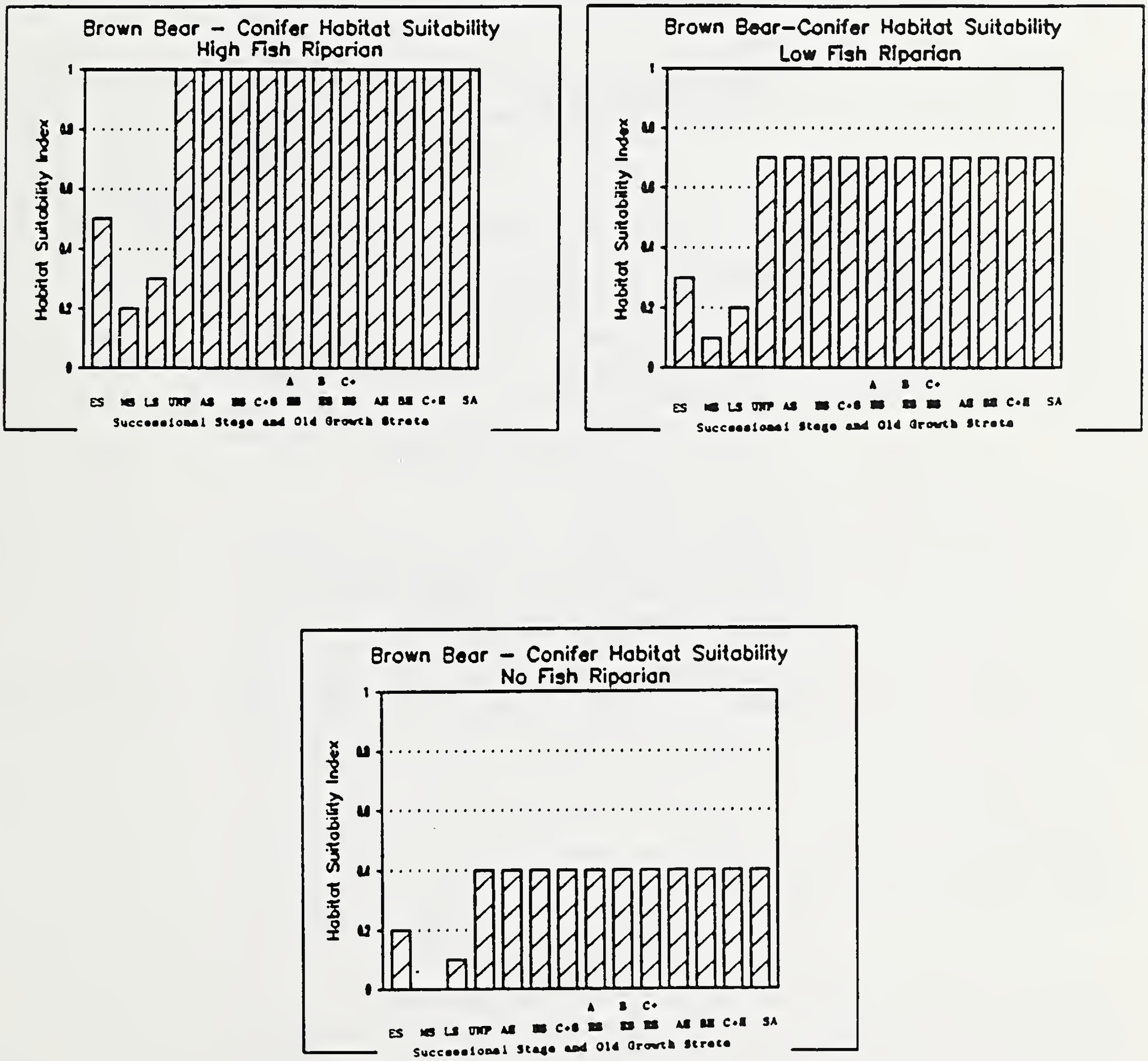


TABLE 3-163

NUMBER OF BROWN BEAR KILLS NOT ASSOCIATED WITH LEGAL HUNTING SEASONS.

Game Management Unit	1980	1981	1982	1983	1984	1985	1986	1987
1A	-	-	-	-	-	1	-	-
1B	-	-	1	-	-	-	-	-
1C	1	-	-	1	-	1	1	-
1D	-	1	-	4	1	2	-	-
3	-	-	-	-	-	-	1	-
4	9	11	2	8	11	5	7	10
5A	3	3	-	-	4	4	1	2
Total	13	15	3	13	16	13	10	12

Source: Alaska Department of Fish and Game, letter dated June 21, 1988

TABLE 3-164

EFFECTS OF DEVELOPMENT AND HUMAN ACTIVITY ON THE HABITAT CAPABILITY FOR BROWN BEAR IN SOUTHEAST ALASKA

Type of Development or Activity	Habitat Capability Reduction (in percent) within Two Influence Zones: less than one mile	one to five miles
Communities:		
Greater than 1,000 people	100	70
501-1,000 people	100	50
11-500 people	70	40
Less than 10 people	50	20
Landfill - no effective incineration	100	50
F. S. Cabin/Developed Campground	20	0
Permanent Camp Site	80	50
Temporary Camp Site	50	20
Access Point (airstrip, dock, floatplane lake)	20	0
Mainline Roads with Ferry Access or Towns	60	30
Secondary Roads with Vehicle Access	40	10
Roads Closed Administratively	20	0
Roads Closed Permanently	10	0

Source: Schoen et al. 1989.

BLACK BEAR

Distribution

Records indicate that historical and current distribution of black bear in Southeast Alaska are the same. Black bear are present throughout the mainland, and on the islands south of Frederick Sound. They are not present in the following Value Comparison Units (VCU's): 22, 124-351, 507, 766-768, 796.

Literature Review

Availability of food and cover influence the movements and distribution of black bear. Depending on the severity of the winter, black bears in Southeast Alaska normally leave their dens in April or May (Erickson et al. 1982). Upon leaving their dens the bear seek out estuaries, beach fringes, and avalanche slopes where they eat the shoots and new leaves of emerging vegetation (Hatler 1972; Modafferi 1982). Between mid-June and mid-July, bears move to mid elevations to feed on salmonberries (Rubus spectabilis) and deer cabbage (Fauria crista-galli) (Modafferi 1982). If streams supporting fish runs are available, bear will feed on spawning salmon from mid-July into autumn. However, in late August, bears will leave a readily available salmon food source for ripening salmonberries and blueberries (Vaccinium spp.) at higher elevations near alpine areas (McIlroy 1972; Modafferi 1982). The bears use this food until they return to their spring-summer range prior to denning in the fall. Many of the foods preferred by black bears grow best in openings, so openings, unless they are very large, tend to enhance the value of forest habitat.

Cover availability is second only to food in determining the suitability of an area for black bears (Lindzey and Meslow 1977; Landers, et al. 1979). Several studies have shown that, although black bears prefer a diversity of early successional stage vegetation communities with for food foraging, they will not forage far from the cover provided by mature to old-growth forest stands (Erickson 1965; McCollum 1973; Lawrence 1979; Barber 1983; Schwartz and Franzmann 1983). Females with cubs are even more sensitive to cover; they have been reported to forage only in forested areas or forage not more than 330 feet from forested cover (Herrero 1978; Rogers 1977).

Cover is critical for providing adequate denning sites. Excavated and natural depressions under tree roots, stumps, and fallen logs are often used for denning (Erickson 1964; Rogers 1970; Lindzey and Meslow 1976; Tietje and Ruff 1980), although caves, bases of hollow trees, and above ground tree cavities have also been used (Jonkel and Cowan 1971; Hamilton and Marchinton 1980; Johnson and Pelton 1981). Bears may prefer to excavate dens in areas that have well drained, stable soils that are excavated easily (Tietje and Ruff 1980). However, ground den sites do not adequately reduce energy loss in Southeast Alaska because of high ground moisture, limited soil development, and variable snow cover (Erickson et al. 1982). In areas of high rainfall, there is a great potential for excavated dens to flood (Johnson and Pelton 1981; Alt and Gruttadauria 1984). In areas where soil is not suitable for excavation, old-growth timber provides den sites (Beecham et al. 1983), with preferred sites being large, hollow trees (Landers et al. 1979). Bears also tend to locate dens in areas where a dense understory conceals them (Poelker and Hartwell 1973; Johnson and Pelton 1981; Beecham et al. 1983; LeCount 1983).

Trees with characteristics suitable for bear dens (large, hollow) and a well developed understory exist in old-growth Southeast Alaska forests (Erickson et al. 1982). Several studies, in Alaska and elsewhere, have reported that bears prefer mature and old-growth forests for den sites rather than regenerating forests (Lindzey and Meslow 1976; Tietje and Ruff 1980; Modafferi 1982).

Habitat

Habitat suitability and capability have been described for five seasons: spring,

Suitability and Capability

early summer, late summer, fall, and denning (Suring et al. 1988). The season which is most limiting for black bears has not been identified; therefore, an annual suitability and capability value for habitats is computed from the values for each season. The following variables have been identified in describing the value of habitats for black bear:

Location/Elevation. Black bears use habitats ranging from estuaries and other coastal habitats to riparian, upland, and alpine habitats. Estuarine, riparian, and coastal habitats receive the highest use by black bears and receive the highest habitat values.

Vegetation. The successional stage of the forest vegetation influences the quantity and quality of forage and cover. Non-forested or non-conifer habitats are also used by black bears. The vegetation types which receive the highest use by black bears receive the highest habitat values.

Fish Abundance. Streams and rivers that produce anadromeus fish have the highest value for black bears, while resident fish streams and streams with no fish have lower values.

Patch Size and Corridors. Black bears have not been identified as a species requiring minimum patch sizes of a particular habitat type. They have large home ranges, utilize a wide variety of habitats with a variety of patch sizes and patterns. Similarly, they do not have specific vegetation corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions (ref. July 31 and August 1, 1989 interagency workshop).

Figures 3-80 and 3-81 display the interrelationships of all of these variables in evaluating the suitability and capability of habitats for black bear. Habitats with the highest value receive a Habitat Suitability Index rating of 1.0, and are capable of supporting an average of 1.9 black bears per square mile of habitat.

Human Disturbance and Mortality Factors

Natural resource management and development, which increases human activity in black bear habitat, must be evaluated in terms of human/bear interactions. Although black bears can adapt to changes in their environment caused by humans, human-related mortality (other than legal hunting mortality) often reduces total density of black bears (Hugie 1979; Pelton 1982). Often, increases in human activity result in increased direct human-induced mortality of bears. Although it is possible to manage legal hunting of bears, it is difficult to control illegal kills, wounding loss, and defense of life or property kills (Schoen et al. 1987b). Table 3-165 displays the number of known black bear kills not associated with legal hunting seasons. From 1980 to 1987 a total of 105 kills occurred.

Suring et al. (1988) estimated the effects of human developments and activity on habitats and populations of black bear (Table 3-166). As access and development increases human activity into occupied black bear habitat, there is potential for the quality and capability of the habitat to decline. Additional discussion on the estimated effects in Table 3-166 is presented later in this section in the analysis of existing habitat capability.

Viable Populations

Due to their population densities and large home ranges, maintaining viable populations of black bear requires large units of land. To maintain black bear populations well distributed within their occupied range, seven geographic units were identified: ADF&G Game Management Units 1A, 1B, 1C, 1D, 2, 3 and 5A

(Yakutat). Within each of these geographic units, maintain habitat to support the following populations to maintain population viability within the planning area: Unit 1A - 125; Unit 1B - 125; Units 1C plus 1D - 125; Unit 2 - 125; Unit 3 - 125, and Unit 5A - 125 (reference interagency meeting records of September 27, 1988 and January 6, 1989).

TABLE 3-165
NUMBER OF BLACK BEAR KILLS NOT ASSOCIATED WITH LEGAL HUNTING SEASONS

Game Management Unit	1980	1981	1982	1983	1984	1985	1986	1987
1A	-	4	-	1	6	7	3	6
1B	-	-	-	-	-	-	-	1
1C	-	4	2	1	6	5	11	16
1D	-	-	-	-	-	1	4	-
2	-	-	2	-	1	3	1	3
3	-	2	1	1	8	4	1	-
5A	-	-	-	-	-	-	-	-

Source: Alaska Department of Fish and Game, letter dated June 21, 1988

TABLE 3-166
EFFECTS OF DEVELOPMENT AND HUMAN ACTIVITY ON THE HABITAT CAPABILITY FOR BLACK BEAR IN SOUTHEAST ALASKA

Type of Development or Activity	Habitat Capability Reduction (in percent) within Zones of Influence: Less than one mile	One to five miles
Open-pit Garbage Dump	90	50
F. S. Cabin/Developed Campground/Seasonal Camp	10	0
Permanent Camp Site/Residence/Float Camp	40	10
Access Point (airstrip, dock, floatplane lake)	10	0
Road Accessible to Vehicles	20	(within 2 miles)
Mainline Roads with Ferry Access or Towns	20	(within 2 miles)
Accessible Road within .5 mile of Anadromous Streams	20	(within 0.5 miles)
Trails or Road Access Limited to Hiking	10	(within 2 miles)
Road Limited to Hiking/ORV's (within .5 mile of Anadromous Streams	10	(within 1 mile)

Source: Suring et al. 1988.

FIGURE 3-80

ANNUAL HABITAT SUITABILITY FOR BLACK BEARS IN SOUTHEAST ALASKA FOR CONIFER SUCCESSIONAL STAGES WITHIN ESTUARY FRINGE, COASTAL, RIPARIAN AND UPLAND AREAS. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; SA= productive subalpine old-growth stands (subalpine is defined as 1500-2000 feet in elevation); A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988

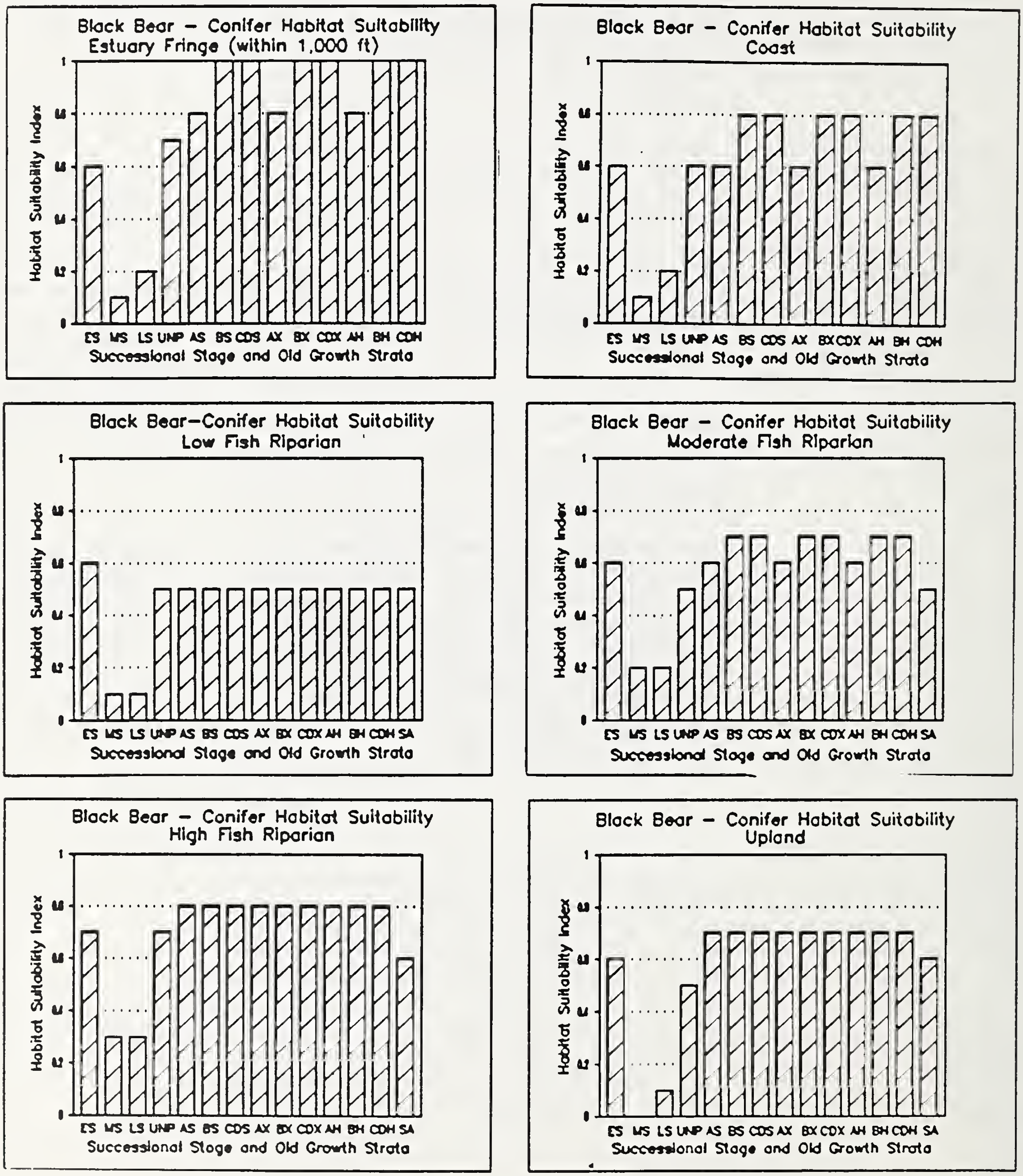
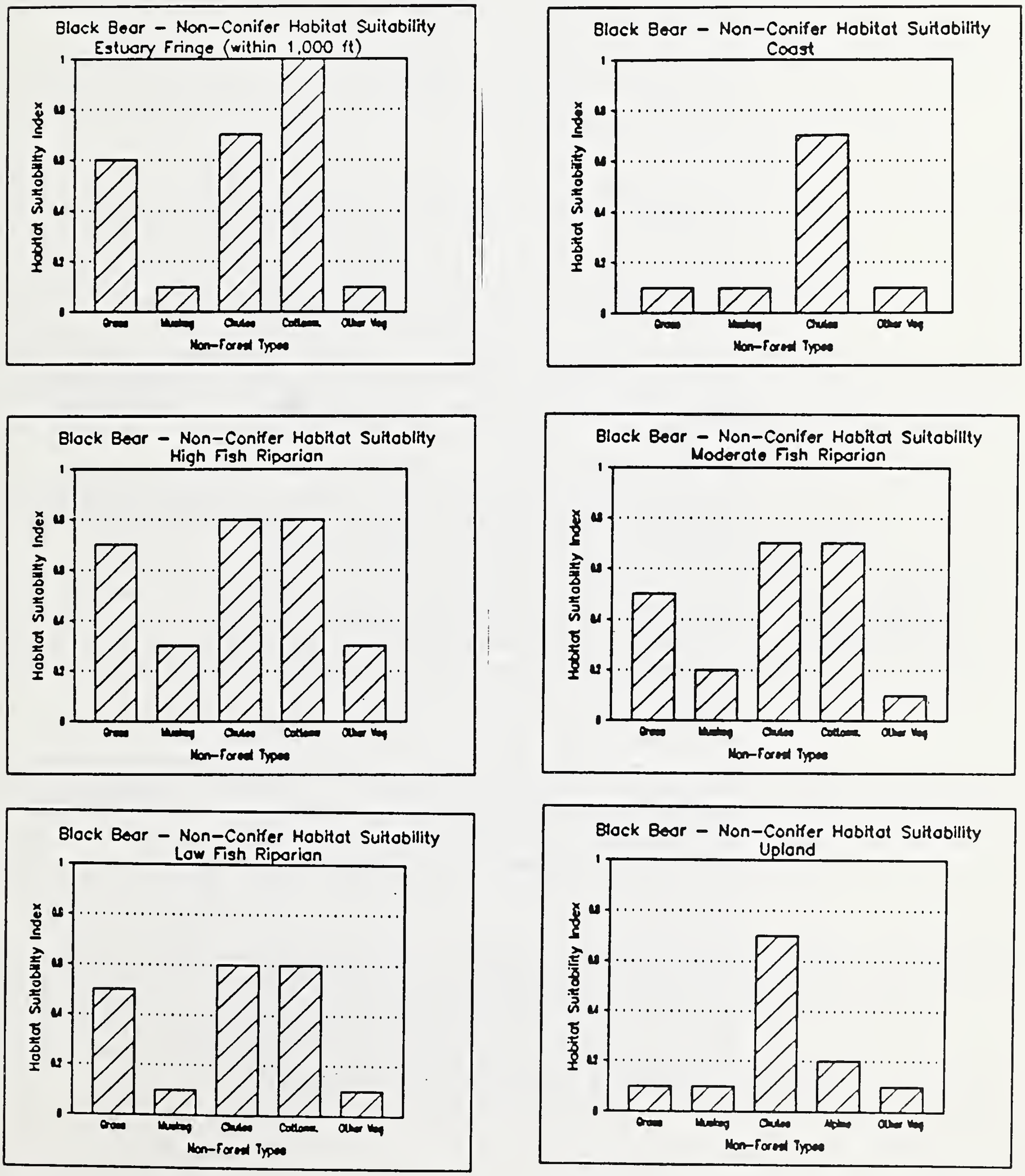


FIGURE 3-81
ANNUAL HABITAT SUITABILITY FOR BLACK BEARS IN SOUTHEAST ALASKA FOR NON-CONIFER HABITATS WITHIN ESTUARY FRINGE, COASTAL, RIPARIAN AND UPLAND AREAS. (Non-forest definitions are as follows: chutes= all avalanche chutes; alpine= all non-forested vegetation above 2000 feet in elevation; other vegetation= all other non-forested vegetation types) Source: Suring et al. 1988



GRAY WOLF

Distribution

Records indicate that the historical and current distributions of gray wolves in Southeast Alaska are about the same. Gray wolves inhabit the mainland and the islands south of Frederick Sound. Gray wolves are not present in the following Value Comparison Units (VCU's): 22, 33-37, 124-351, 481, 507, 564-566.

Literature Review

During the early 1900's, gray wolves were subjected to indiscriminate killing and bounties throughout Alaska (Harbo and Dean 1983). In the 1940's, a federal wolf control program with emphasis on poisoning and aerial hunting began. It continued in Southeast Alaska until 1959. Today, gray wolf populations in Alaska are stable to increasing (Townsend 1986).

Gray wolves do not show a preference for specific habitats or habitat characteristics (Paradiso and Nowak 1982). The presence and well-being of gray wolves seems to depend on availability of their prey rather than landform, climate, or vegetation.

A review of the population dynamics of gray wolves shows that population increase is determined by the availability of ungulate prey (Keith 1983) and social factors (Potvin 1988). Packard and Mech (1980) concluded that intrinsic social factors and the influence of food supply are interrelated in determining population levels of gray wolves. It has been demonstrated that predation by gray wolves sustains declines in ungulate populations that have been initiated by the other factors such as severe weather and habitat change (Mech and Karns 1977; Nelson and Mech 1981; Gasaway, et al. 1983; Van Ballenberghe and Hanley 1984; Smith, et al. 1986a). Gray wolf populations decline as the populations of the species they prey upon decline (Van Ballenberghe and Mech 1975; Messier 1985, 1987).

The gray wolf has adapted to a carnivorous diet that is made up mainly of large ungulates or beaver (Paradiso and Nowak 1982). In Southeast, gray wolves prey on Sitka black-tailed deer, moose, mountain goat, beaver, and spawning salmon (LaResche et al. 1974; Fox and Streveler 1986; Smith et al. 1986b).

Habitat Suitability and Capability

Habitat suitability and capability for gray wolves is tied directly to populations of their principal prey species. A habitat capability model was developed by an interagency task group and is described by Suring et al. (1988). This model identifies the following variables in describing the value of wolf habitat:

Prey Abundance. The assumption is made in this model that gray wolves will first select large ungulates as prey and utilize beaver as maintenance prey when ungulates are not plentiful (Mech 1970). As a minimum, 3.7 pounds per day of prey are required to maintain a gray wolf (Mech 1970). The normal amount of prey consumed by gray wolves ranges from 5.5 pounds to 13.9 pounds per day (Mech 1974). The median figure of 9.7 pounds per day is used in the habitat capability model. The proportion of a prey population that is harvested by wolves and the average weights for the different prey species are evaluated with the model.

Social Factors. Due to social interactions, wolf densities do not exceed certain levels even when prey abundance is high. Densities of 0.1 adult gray wolf per square mile are considered high (Paradiso and Nowak 1982). This density has been generally accepted as the saturation point beyond which gray wolf populations would not expand (Pimlott 1967; Mech 1970). Maximum density of adult gray wolves in this model will not exceed 0.1 per square mile.

Patch Size and Corridors. Gray wolves have not been identified as a species requiring minimum patch sizes of a particular habitat type. They have large home ranges, utilize a wide variety of habitats with a variety of patch sizes and patterns. Similarly, they do not have specific vegetation corridor requirements, as they travel and disperse through a variety of terrain and vegetative conditions (ref. July 31 and August 1, 1989 Interagency workshop).

A general mathematical formula for the gray wolf model is as follows:

(prey population) x (proportion of prey population killed by wolves) x (average weight of the prey species) x (proportion of a carcass normally eaten) divided by (9.7 pounds per day to sustain a wolf) divided by (365 days per year) = total number of wolves which can be sustained per year.

The following values are used for the formula (Suring et al. 1988):

	Deer	Moose	Mtn. Goat
Proportion of population killed by wolves	20%	5%	5%
Average weight of prey	68 lbs.	700 lbs.	110 lbs.
Proportion of carcass eaten	75%	75%	75%

Human Disturbance and Mortality

Wolves are legally harvested in Southeast Alaska. Although access and increased human activity may result in increased wolf mortality, additional reduction in habitat suitability or capability as the result of human disturbance or access have not been documented or developed for the gray wolf habitat capability model.

Viable Populations

As ungulate prey populations decline due to habitat changes or severe winters, gray wolf populations exhibit a similar decline (Van Ballenberghe et al. 1975; Van Ballenberghe and Mech 1975). It is assumed that gray wolves subsist upon beaver in Southeast Alaska when ungulate populations are at low levels. Such a situation currently exists on the northeast portion of Revillagigedo Island in southern Southeast Alaska (Smith et al. 1986b). Late winter population density of gray wolves in this area was estimated to be 0.01 per square mile. This is the lowest density of wolves considered to be a viable population within wolf occupied range on the Tongass National Forest (Suring et al. 1988; interagency meeting records of September 26, 1988 and January 6, 1989).

RED SQUIRREL

Distribution

Before 1930 and 1931, red squirrels existed only on the mainland of Southeast Alaska. In 1930 and 1931 they were introduced to Baranof and Chichagof Islands as a potential prey species for the introduced marten (Burris and McKnight 1973). Today, red squirrels are currently abundant on many of the islands and the mainland. Red squirrels are not present in the following Value Comparison Units (VCU's): 527-707, 865, 866.

Literature Review

Habitat selection for red squirrels is related to food supply, food cache sites, and nesting cover. Red squirrels' main food source is conifer seeds. Although they may use conifer forests for other reasons, significant use of conifer forests by squirrels does not occur until those forests have reached seed-producing age.

Red squirrel habitat selection is also related to food cache sites. Large diameter trees, large standing snags, and fallen trees are important sites for

cone storage, caches, and feeding stations (Vahle and Patton 1983). The crevices under downed logs and cavities in snags provide protection for stored cones.

Habitat quality is also related to nesting cover. Red squirrels prefer natural cavities as nesting sites (Hamilton 1939; Layne 1954). When these cavities are not available, underground nests and external tree nests are commonly used (Fancy 1980).

Optimum habitat for red squirrels provides opportunities for obtaining food, food caching sites, and nesting cover (Vahle and Patton 1983). This includes forested stands with two or more species of conifers of cone-bearing age for food, snags for den sites, and downed logs to serve as nuclei for food caches. These conditions are best provided in old-growth Sitka spruce (Picea sitchensis) forests in Southeast Alaska. Although western hemlock (Tsuga heterophylla), western red cedar (Thuja plicata), and Alaska yellow-cedar (Chamaecyparis nootkatensis) forest types provide the life requirements of red squirrels, food resources are not as plentiful in these Forest types as they are in spruce forests.

Tree densities in Southeast Alaska's muskegs tend to be low, with trees situated in stringers or small groups. Red squirrels rarely use these isolated trees or clumps of trees for nesting (Rothwell 1979).

Although significant declines in red squirrel populations occur following clearcutting (Wolff and Zasada 1975; Medin 1986), red squirrels still use clearcuts as habitats (Krull 1970). Fisch and Dimock (1978) reported squirrels clipping buds and new shoots in regenerating six to 12 year old clearcuts in western Oregon and Washington.

Sitka spruce do not begin producing cones (food for squirrels) until age 40 years (Ruth 1958) which diminishes the value of pole stands as habitats for red squirrels. Heavy cone and seed production has been reported in 100 year old stands of western hemlock and Sitka spruce indicating valuable habitat for red squirrels (Ruth and Berntsen 1955). But, these same 100 year old stands do not provide nesting and food caching cavities.

Habitat Suitability and Capability

A red squirrel habitat capability model was developed by an interagency task group, and is described by Suring et al. (1988). This model identifies the following variables in describing red squirrel habitat:

Elevation: Habitat usually does not exist for red squirrels above 2,000 feet elevation; habitat value from 1,500 to 2,000 feet elevation is lower than at elevations below 1,500 feet.

Vegetation: Tree species and successional stages of forest stands affect the quality of habitat for red squirrels. Spruce trees and mature to old-growth forests have the highest values for red squirrel habitat.

Patch Size and Corridors: Red squirrels have been identified as a species which show a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 30 acres in size, and use declines with decreasing patch size and approaches zero when patches are less than three acres (Figure 3-82). Patch size includes the acres of all cone producing conifer stands. Corridors of pole timber or older stands of trees

facilitate movement and dispersal (ref. July 31 and August 1, 1989 interagency workshop)

Figure 3-83 displays the interrelationships of elevation, tree species and successional stage in evaluating the suitability and capability of habitats for red squirrel. Habitats with the highest value receive a Habitat Suitability Index rating of 1.0 and are capable of supporting an average of 1280 squirrels per square mile of habitat.

Human Disturbance and Mortality Factors

For red squirrels, no documentation exists on reductions in habitat suitability and capability due to human access and/or disturbance.

Viable Populations

Due to the high densities of red squirrels within a wide range of successional stages, it is believed that concerns for viable populations with any benchmarks or alternatives are non-existent.

FIGURE 3-82

EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT RED SQUIRREL.

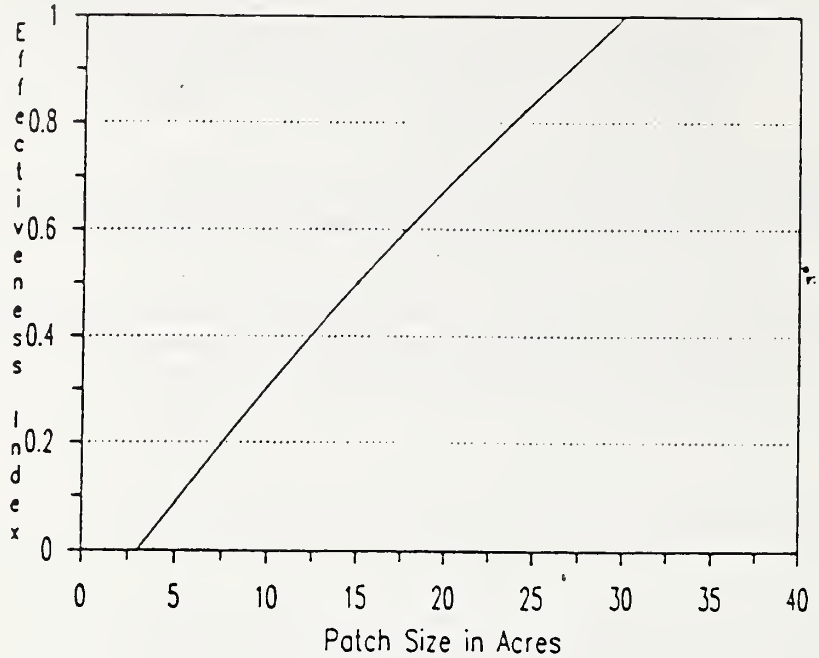
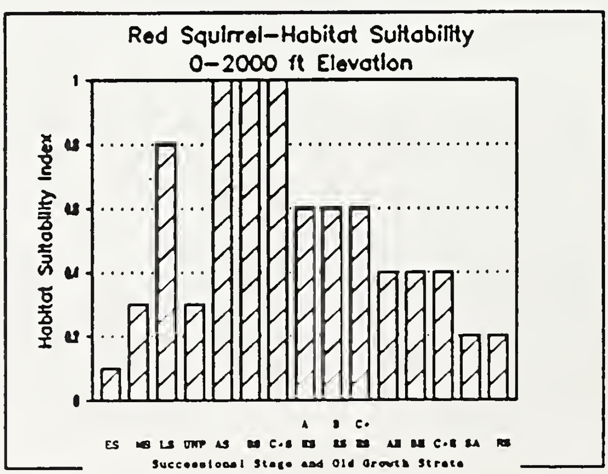


FIGURE 3-83

HABITAT SUITABILITY FOR RED SQUIRREL IN SOUTHEAST ALASKA. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; SA= productive subalpine old-growth stands (subalpine is defined as 1500-2000 feet in elevation); Cot= cottonwood stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988



BALD EAGLES

Distribution

Bald eagles are found throughout Southeast Alaska. They are primarily associated with coastal habitats and inland riparian habitats. Historical and current distributions are the same.

Literature Review

The majority of bald eagles in Southeast Alaska nest in coniferous forest habitats along the coastline and saltwater inlets. Bald eagles prefer to nest near the coast, where they forage for fish, waterbirds, marine invertebrates, and drifting carrion (Kalmback et al. 1964; Ofelt 1975). Of 3,850 nests surveyed by Hodges and Robards (1982), 92 percent occurred within 300 feet of the shoreline, with an average shoreline-to-nest distance of 120 feet. Not all types of shoreline appeared equally acceptable to nesting bald eagles. The majority (55 percent) of nests examined were located along inland seas or broad channels. Nesting along saltwater bays was also common (31 percent). Brackish lagoons, open seas, and narrow saltwater channels without tidal currents were used less frequently. Nests were commonly found on prominent points of land, small islands, narrow passages with tidal currents, and shorelines exposed to large bodies of water, especially those facing into prevailing winds, situations which may provide the best opportunities for foraging over open water on tidal flats.

Almost all nesting along the coast in Southeast Alaska occurs in old-growth stands located within a well-forested landscape. Hodges et al (1984) found that clearcuts without sufficient remnant old-growth trees were avoided by nesting eagles. Hodges and Robards (1982) found that 78 percent of the 3,850 eagle nests they surveyed were located in Sitka spruce (Picea sitchensis). Sitka spruce trees are usually taller and have a stronger top and branches than western hemlock (Tsuga heterophylla), which comprised 20 percent of the nest sites. Only two percent of the nest sites were found in Western redcedar (Thuja plicata). Large, old trees are most commonly selected by bald eagles for nesting. Hodges and Robards found that nest trees had an average height of 97 feet and an average diameter of 3.6 feet. These measurements suggest that typical nest trees are at least 400 to 500 years old. Other tree species are also used for eagle nesting.

The mainland of Southeast Alaska contains 12 major river systems and several minor river systems. These rivers are generally of glacial origin and flow in braided patterns over wide gravel beds on the valley floors. The more stable portions of these river bottomlands support stands of large, mature black cottonwood (Populus trichocarpa) trees that are used as nesting, roosting, and perching habitat by bald eagles (Hodges 1979; Hughes 1981).

Although eagle nest densities along these rivers were highly variable and fluctuated from year to year in response to food abundance and weather conditions, Hodges (1979) found large mainland river systems supported an estimated 200 bald eagle nests. Nests were generally observed in riparian areas of rivers and lakes. Occasional eagle nests have also been found along the major island streams and lakes on larger islands such as Prince of Wales (Hodges and Robards 1982).

The value of a stand as bald eagle nesting habitat is directly related to forest structure and composition. Sites with tall, well-developed canopies and a high percentage of Sitka spruce in the overstory will be preferred by bald eagles (Hodges and Robards 1982). Stands with timber volumes greater than 8,000 board feet per acre generally provide nesting sites suitable for bald eagles, sites with less than 8,000 board feet per acre such as muskegs are less suitable. Nonforested areas offer no opportunity for bald eagle nests.

Availability of fish as food for bald eagles is assumed to be a prime factor in the suitable riparian area habitat for bald eagles. Bald eagles seem to prefer streams that produce anadromous fish (Class I) rather than those that only produce resident fish such as cutthroat trout (Class II). They find little foraging value in streams that do not support fish. Due to their size, lakes of 50 acres or more are assumed to support more prey for bald eagles than smaller lakes. Lakes and streams above 800 foot elevations are less likely to be eagle foraging areas because anadromous fish are less likely to be present at high elevations. Weather conditions in the spring are also less conducive to successful nesting at elevations above 800 feet.

Habitat Suitability and Capability

The adult bald eagle population has been estimated to have increased from 10,000 birds in the early 1980's to 12,000 birds in the late 1980's. Most of the data collected in Southeast Alaska has primarily been on nesting habitat. The U.S. Fish and Wildlife Service maintains locations of all identified bald eagle nests: their records have identified 7,022 nest sites as of December 1988. About 98 percent of these nest sites have been found along the coast, with the remaining two percent located along rivers and lakes. Not all of the coastline and rivers and lakes have been surveyed for bald eagle nests. Table 3-167 displays the number of known bald eagle nests, and identifies the miles of surveyed and unsurveyed coastlines within each of the FORPLAN geozones.

An Interagency task force developed a nesting habitat capability model for bald eagles in Southeast Alaska (Suring et al. 1988). This model identifies the following variables in describing the value of nesting habitat:

Location. Coastal habitats have been identified as having the highest value for nesting bald eagles. Riparian habitats around rivers and lakes have lower value. Habitats outside the coastal and riparian areas have no value for nesting bald eagles.

Elevation. Most nest sites are located below 800 feet elevation; above this elevation, little to no value exists for nesting habitat.

Stream Class. Rivers and streams with anadromous fish (Class I streams) have higher value for nesting bald eagles than rivers and streams with resident fish (Class II streams). Streams with no fish have no value for bald eagles.

Lake Size. Lakes larger than 50 acres have higher value than lakes less than 50 acres in size.

Vegetation. Spruce trees are preferred over other species of trees. Mature and old-growth stands provide the large trees selected by eagles for nest sites.

Patch Size and Corridors. Bald eagles nest on almost every island size. They have not been identified as needing particular patch sizes or vegetative corridors for movement or dispersal (reference July 31 and August 1, 1989 interagency workshop).

Figure 3-84 displays the interrelationships of these variables in evaluating the suitability and capability of habitats for bald eagle nesting. Habitats with the highest value receive a Habitat Suitability Index of 1.0 and are capable of supporting an average of 26 adult bald eagles per square mile of habitat.

Human Disturbance and Mortality Factors

Human activities around nest sites, winter roosting areas, and other bald eagle use areas may temporarily displace eagles or cause them to abandon the site. The U.S. Fish and Wildlife Service and the Forest Service maintain an interagency agreement for bald eagle habitat management in the Alaska Region. This interagency agreement provides management standards and guidelines regulating human disturbance within identified bald eagle use areas. The IDT believes it is not necessary to reproduce this interagency agreement in the AMS.

Viable Populations

Using data from the Pacific Bald Eagle Recovery Plan (U.S. Fish and Wildlife Service, Pacific Bald Eagle Recovery Plan, August 1986), an interagency task group recommended that the smallest population of bald eagles which would be considered viable for Southeast Alaska would be the following: a minimum of 800 nesting pairs with an average reproductive rate of 1.0 fledged young per pair, with an average success rate per occupied site of not less than 65 percent. The task group also recommended that a minimum one-half mile long by 500 foot wide old-growth beach fringe zone would need to be maintained for nest sites for each of the 800 pairs (reference interagency meeting records of September 26, 1988 and January 6, 1989).

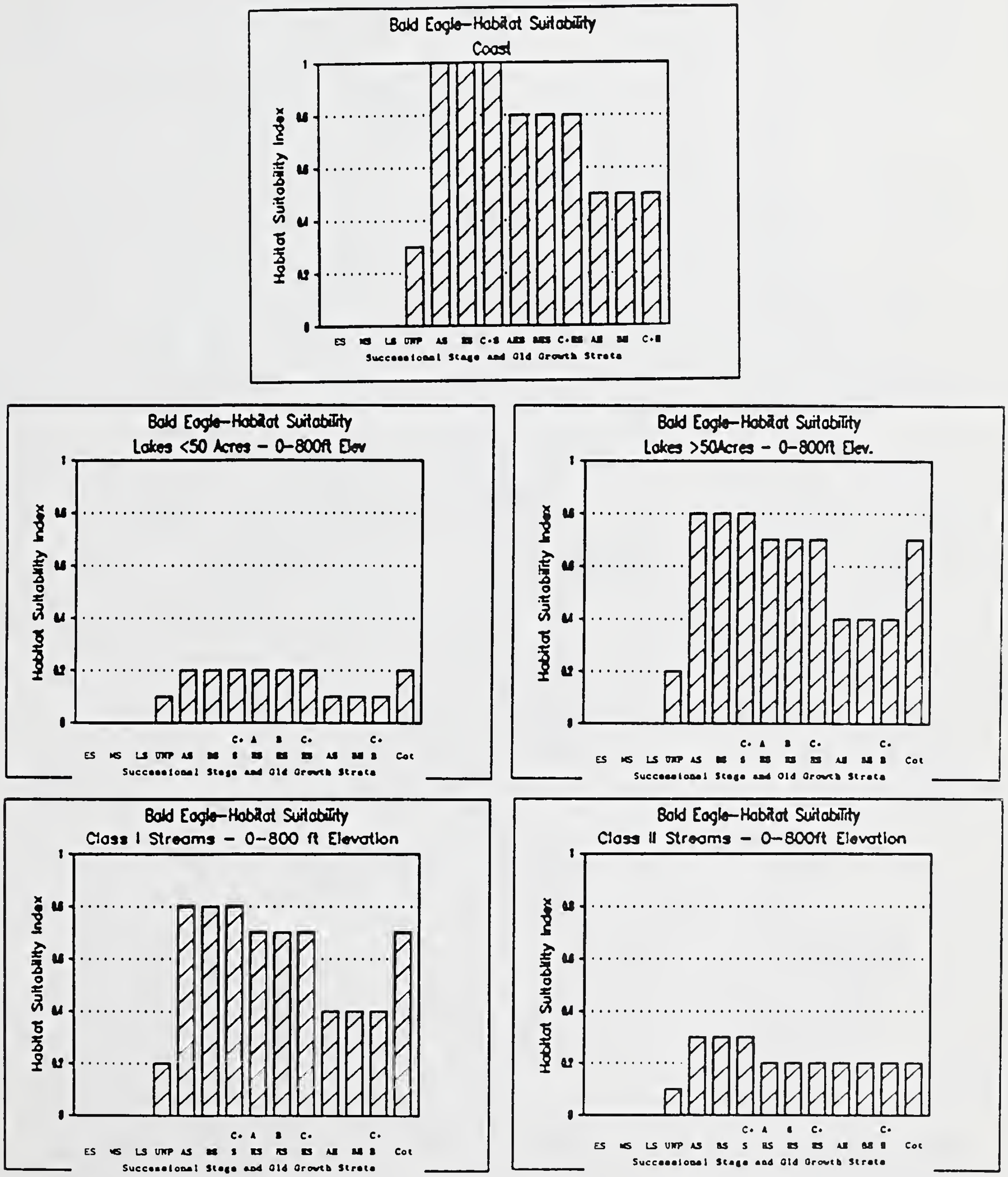
To maintain the bald eagles well distributed within their occupied range, the task group recommended that the 800 nesting pairs would need to be distributed in the same proportion as the existing nest distribution within each of the FORPLAN geozones (reference interagency meeting records of September 26, 1988 and January 6, 1989). However, since as much as 40 percent of the coastline has not been surveyed for existing nests, the IDT believed a more complete approach would be to distribute the 800 nesting pairs in the same proportion as the existing (1989) outputs from the habitat capability model. By this method, unsurveyed coastlines would be included.

TABLE 3-167
NUMBER OF SURVEYED BALD EAGLE NESTS, AND MILES OF SURVEYED, PARTIALLY SURVEYED AND UNSURVEYED COASTLINE WITHIN EACH GEOZONE

Geo-zone	Number of Surveyed Nests	Miles of Surveyed Coastline	Miles of Unsurveyed Coastline	Miles of Part Surveyed Coastline
C01	44	64	113	3
C02	345	187	0	0
C03	10	10	57	31
C04	50	21	0	9
C05	95	70	0	36
C06	292	177	0	25
C07	9	3	17	0
C09	213	163	43	0
C10	132	106	115	222
C11	6	0	149	41
C12	64	76	73	125
C13	0	0	356	20
C14	16	17	132	0
C15	929	705	0	0
C16	0	0	0	0
C17	11	16	91	0
C18	255	74	0	0
C20	139	87	0	0
C21	320	92	0	0
C22	38	19	69	0
C23	222	156	81	23
C24	96	30	64	0
C25	216	111	0	57
K01	0	16	0	0
K02	0	0	150	0
K04	236	229	77	45
K05	108	140	0	17
K06	313	304	33	89
K07	77	84	243	112
K08	571	313	37	69
K09	147	152	108	37
K10	46	14	174	0
K11	249	180	0	268
K12	1	0	71	0
K13	105	392	500	29
K14	1	0	220	0
K15	0	0	125	0
S01	316	267	16	141
S02	181	226	0	0
S03	198	88	54	53
S04	41	47	10	3
S05	87	77	0	0
S06	203	180	0	159
S07	84	71	0	0
S08	156	85	22	29
S09	84	128	12	0
S10	92	117	38	55
S11	0	0	145	0
S12	52	5	106	0
S13	10	37	0	0
S14	151	136	0	39
Total	7,011	5,501	3,501	1,737

Source: U.S. Fish and Wildlife Service records, December, 1988. Revision Database August 21, 1989; Revision Database October 30, 1989.

FIGURE 3-84
HABITAT SUITABILITY FOR NESTING BALD EAGLES IN SOUTHEAST ALASKA. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; Cot= cottonwood stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988



RED-BREASTED SAPSUCKER

Distribution

The breeding range of the red-breasted sapsucker extends from northern Southeast Alaska through western British Columbia and into western Washington and Oregon (Howell 1952). This sapsucker is found throughout Southeast Alaska during the spring, summer and early fall seasons, and winters in the coastal portion of its breeding range as far north as Prince of Wales Island (Howell 1952; Howell 1953).

Literature Review

The red-breasted sapsucker is considered a "keystone" species in Southeast Alaska because it is the primary excavator of cavities used by secondary cavity nesters (Sidle and Suring 1986).

Breeding territories of sapsuckers encompass nesting and feeding sites (Crockett 1975). Nest sites of sapsuckers appear to be chosen for individual nest tree characteristics (Bull et al. 1986) as well as for their proximity to suitable foraging habitat (Crockett and Hadow 1975). Breeding territories are often occupied by the same pairs year after year with territory size being approximately 10 acres.

Reported nest tree diameters in breeding territories ranged from 10 inches to 22 inches (Bull 1978; Raphael and White 1984). While sapsuckers use smaller diameter trees, they tend to be more productive if they are able to use larger diameter trees. Larger diameter nesting cavities can be excavated in larger diameter trees and snags. Clutch size of hole-nesting passerines has shown to increase with increased cavity diameter (Karlson and Nilsson 1977). Larger diameter trees also provide thicker insulation around the nest cavity (Raphael and White 1984).

Possibly because of the accumulation of fecal matter, Sapsuckers excavate a new hole every year (Kilham 1962; Kilham 1977). Although sapsuckers excavate only one nest hole per year, they may begin excavations on several trees before a final one is selected (Howell 1952; Jackman 1974). Often a tree which was used in a previous year is used again (Howell 1952). Nest trees are usually alive or have been dead less than 3 years (Bull et al. 1986). Since the sapsucker is a poor excavator (Spring 1965), it usually nests in trees with advanced heartrot (Shigo and Kilham 1968; Erskine and McLaren 1972; Miller et al. 1979).

Red-breasted sapsuckers return to Southeast Alaska in March every year. they prefer old-growth western hemlock and spruce stands (Hughes 1985). Hughes found that red-breasted sapsuckers were approximately twice as abundant in 8,000-20,000 board feet per acre old-growth stands than in 20,000 board feet per acre and over stands. The low volume stands provided the open habitat that has been reported as preferred by sapsuckers elsewhere (Crockett and Hadow 1975). Although mean snag diameters (16 inches) are smaller in low volume stands than in mid and high volume stands (Hughes 1985) they are within the range of snag diameters reported as used by sapsuckers (Bull 1978; Raphael and White 1984).

Habitat Suitability and Capability

Since the red-breasted sapsucker is migratory, and is present throughout Southeast Alaska only during the breeding season, a breeding habitat capability model was developed by an interagency task group, and is described by Suring, et al. (1988). The quantity and quality of suitable breeding habitat has been identified as the habitat most likely to be affected by Forest management activities. The task group notes however, that breeding habitat may not be the limiting factor for the specie's population, as the quantity and quality of winter habitat in other portions of its range may ultimately be the limiting factor for the population.

Quantity of snags determine whether red-breasted sapsuckers will use the area. Table 3-168 displays this relationship.

TABLE 3-168

NUMBER OF SNAGS REQUIRED PER 100 FORESTED ACRES TO SUPPORT VARIOUS PERCENTAGES OF MAXIMUM RED-BREASTED SAPSUCKER POPULATIONS IN SOUTHEASTERN ALASKA 1/

Percent of Maximum Population	100	90	80	70	60	50	40	30	20	10
No. of Snags 2/	160	144	128	112	96	80	64	48	32	16

Source: Suring 1988.

1/ Forested acres refers to all lands capable of supporting 10 percent tree cover.

2/ Soft and hard snags which are greater than or equal to 15 inches diameter at breast height, and greater than or equal to 10 feet in height.

A forest-wide inventory on the number of snags does not exist. Research and timber stand exams in Southeast Alaska have identified which forest types and successional stages provide the most favorable red-breasted sapsucker nesting habitat. The habitat capability model identifies the following variables in describing the value of breeding habitat:

Vegetation. The successional stage of the forest vegetation directly relates to the quantity, quality and long-term supply of snags. Old-growth forests provide the best snag habitat over the long term. Lower volume classes of old growth have been found to receive higher use by sapsuckers than higher volume classes. Muskeg forests generally have small diameter, widely-spaced trees that are not preferred by sapsuckers. Black cottonwood (Populus trichocarpa) forests may provide suitable nesting sites, and limited forage opportunities early in the year before sap is available. Due to their small tree diameters, red alder (Alnus rubra) forests tend to provide limited nesting sites.

Elevation. Lower elevations are better nesting habitat and receive greater use than higher elevations.

Patch Size and Corridors. Red-breasted sapsuckers have been identified as a species which show a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 250 acres in size, and use declines with decreasing patch size and becomes zero when patches are less than five acres (Figure 3-85). Patch size includes the acres of all old-growth conifer stands and mature to old-growth black cottonwood stands. Since sapsuckers migrate across open water and many vegetation types to get to winter and summer areas, it is not believed that they require specific vegetative corridors (reference July 31 and August 1, 1989 interagency workshop).

Figure 3-86 displays the interrelationships of vegetation and elevation on the habitat suitability for red-breasted sapsuckers. Habitats with the highest value receive a Habitat Suitability Index of 1.0 and are capable of supporting an average of 134 red-breasted sapsuckers per square mile of habitat.

Human Disturbance and Mortality Factors

Reductions in habitat suitability and capability due to disturbance and mortality caused by humans have not been identified for the red-breasted sapsucker.

Viable Populations

To maintain populations "well distributed" within their occupied range on the islands, Alaska Department of Fish and Game "wildlife analysis areas" were identified as geographic units that would recognize and take into account the distribution of red-breasted sapsuckers among the islands of Southeast Alaska. To maintain population viability within the planning area, maintain habitat to support 50 animals within each of the wildlife analysis areas (reference interagency meeting records of September 26, 1988 and January 6, 1989).

FIGURE 3-85

EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT RED-BREASTED SAPSUCKERS.

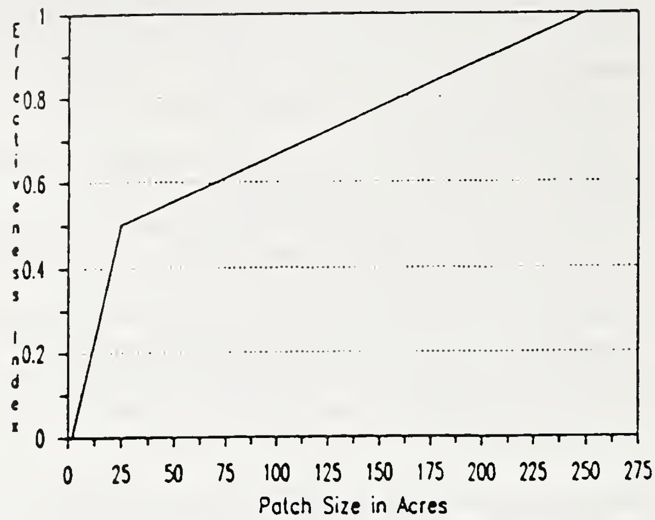
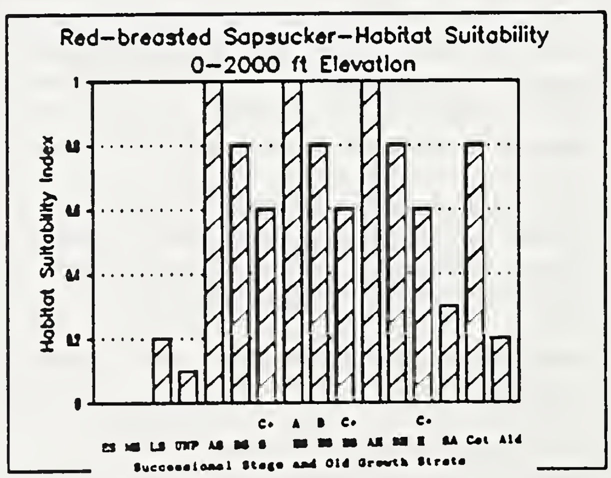


FIGURE 3-86

BREEDING HABITAT SUITABILITY FOR RED-BREASTED SAPSUCKER IN SOUTHEAST ALASKA. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; SA= productive subalpine old-growth stands (subalpine is defined as 1500-2000 ft elevation; Cot= cottonwood stands; ALD= alder stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988



HAIRY WOODPECKERS

Distribution

Associated with snags and partially dead trees for foraging and nesting, the hairy woodpecker is considered an uncommon, permanent resident throughout Southeast Alaska (Sidle and Suring 1986).

Literature Review

Hairy woodpeckers prefer dense stands with a tall canopy, large diameter trees, and nest cavities that are high above the ground (Conner and Adkisson 1977). During the winter, hairy woodpeckers become much more selective in their habitats (Conner 1981). Winter habitats are characterized by high, heavy canopy cover provided by large, widely-spaced trees and additional cover in the subcanopy (Morrison et al. 1986). Because they must excavate deeper in search of prey (ants and other insect pupae) during the winter, hairy woodpeckers increase their use of large limbs and trunks of dead trees and dead portions of live trees (Connor 1980; Morrison et al. 1985).

Hughes (1985) found hairy woodpeckers in Southeast Alaska preferred high volume (greater than 30,000 board feet per acre) old-growth stands of western hemlock (Tsuga heterophylla) and Sitka spruce (Picea sitchensis). They do not prefer muskeg, or non-commercial forests with small diameter, widely-spaced trees. Black cottonwood (Populus trichocarpa) forests may provide suitable nesting sites but they provide limited winter habitat. Early clearcuts may provide some foraging opportunities but are generally unavailable for winter habitat. Regenerating clearcuts have little potential hairy woodpecker habitat (Conner et al. 1975). Although snags do occur in second-growth stands, they are not used by cavity nesters because their diameters are too small (Chadwick et al. 1986). Remnant snags in second-growth stands receive very little use by woodpeckers because of the high tree density which they find unsuitable (Mannan, et al. 1980).

Habitat Suitability and Capability

Winter roosting and foraging habitat have been suggested as the limiting factor for resident cavity nesting birds (Raphael and White 1984; Haapanen 1965, p. 190). An Interagency task group developed a winter habitat capability model for hairy woodpeckers in Southeast Alaska (Suring et al. 1988).

Snag quality has a direct relationship with the potential of an area to support hairy woodpeckers. Table 3-169 displays this relationship.

TABLE 3-169
NUMBER OF SNAGS REQUIRED PER 100 FORESTED ACRES TO SUPPORT VARIOUS PERCENTAGES OF MAXIMUM HAIRY WOODPECKER POPULATIONS IN SOUTHEASTERN ALASKA 1/

	% of Maximum Populations									
	100	90	80	70	60	50	40	30	20	10
No. of Snags 2/	672	605	538	470	403	336	269	202	134	67

Source: Suring 1988.

1/ Forested acres refers to all lands capable of supporting 10 percent tree cover.

2/ Soft and hard snags which are greater than or equal to 15 inches dbh and greater than or equal to 10 feet in height.

A forest-wide snag inventory does not exist. Research and timber stand exams in Southeast Alaska have identified which forest types and successional stages provide the most favorable nesting habitat for hairy woodpeckers. The habitat capability model identifies the following variables in describing the value of breeding habitat:

Vegetation. The successional stage of the forest vegetation has a direct relationship to the quantity, quality, and long-term supply of snags. Old-growth forests provide the best long-term snag habitat. Higher volume classes have been found to receive higher use by sapsuckers than have lower volume classes.

Elevation. Lower elevations are better winter habitat and receive higher use than do higher elevations

Patch Size and Corridors. Hairy woodpeckers have been identified as a species which shows a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 500 acres in size, and use declines with decreasing patch size and becomes zero when patches are less than 10 acres (Figure 3-87). Patch size includes the acres of all old-growth conifer stands and late succession conifer stands. Specific vegetative corridor requirements have not been identified for the hairy woodpecker (reference July 31 and August 1, 1989 interagency workshop).

Figure 3-88 displays the interrelationships of vegetation and elevation on the habitat suitability for hairy woodpeckers. Habitats with the highest value receive a Habitat Suitability Index of 1.0 and are capable of supporting an average of 32 hairy woodpeckers per square mile of habitat.

Human Disturbance and Mortality Factors

Reductions in habitat suitability and capability due to mortality and disturbance caused by humans have not been identified for the hairy woodpecker.

Viable Populations

To maintain populations "well distributed" within their occupied range on the islands, Alaska Department of Fish and Game "wildlife analysis areas" were identified as geographic units that would recognize and take into account the distribution of hairy woodpeckers among the islands of Southeast Alaska. To maintain population viability within the planning area, maintain habitat to support 50 animals within each of the wildlife analysis areas (reference interagency meeting records of September 26, 1988 and January 6, 1989).

FIGURE 3-87
EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT HAIRY WOODPECKERS

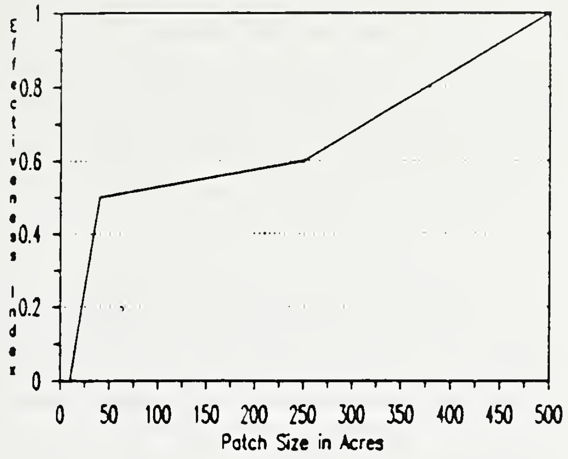
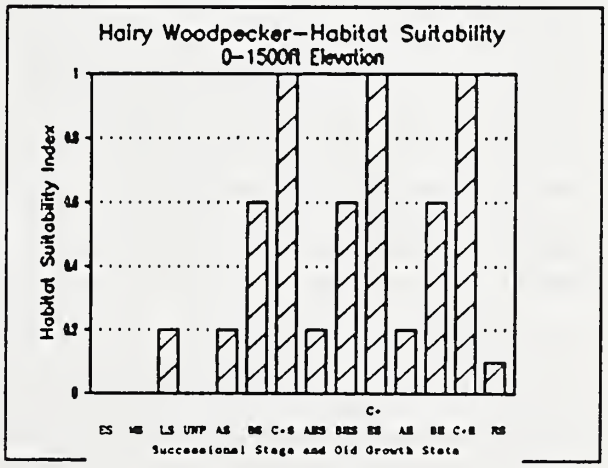


FIGURE 3-88
WINTER HABITAT SUITABILITY FOR HAIRY WOODPECKERS IN SOUTHEAST ALASKA. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; Cot= cottonwood stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988



BROWN CREEPER

Distribution

Associated with large, old-growth trees, the brown creeper is considered an uncommon, permanent resident throughout Southeast Alaska (Sidle and Suring 1986). It represents the old-growth forest community.

Literature Review

The diet of brown creepers consists of larvae, pupae, and eggs of insects gathered from bark crevices, spiders, other small invertebrates, and occasionally seeds (Pearson 1923; Reilly 1968). The brown creeper uses its long (0.6 inch), slightly downward curving bill to pick food items from cracks and crevices in the bark and off the bark surface without disturbing it (Davis 1978). This bird typically flies to the base of a tree and searches for food in an upward spiraling pattern (Franzreb 1985).

Brown creepers prefer large diameter trees because they can feed longer on them and capture more prey per visit (Raphael and White 1984; Airola and Barrett 1985). Larger diameter trees produce more beetle larvae per unit surface area than smaller trees (Parker and Stevens 1979). Jackson (1979) showed that larger trees with furrowed bark support larger numbers of insects than do the smooth barked smaller trees. It is thought that brown creepers and other bark foraging birds select larger diameter trees as foraging sites during cold, windy weather to lessen their exposure to the elements (Willson 1970; Grubb 1975; Webber 1986)

Brown creepers forage almost exclusively on trunks of live trees in conifer forests (Raphael and White 1984; Morrison, et al. 1987; Morse 1970). They tend to move from one tree to another when the branch density of the tree they are on impairs their maneuverability (Franzreb 1985), tending to select tall trees which have more room for foraging before branches are encountered. Tree size rather than species is more of a determinant in forage site selection. The area necessary to support the brown creeper increases as the number of large, tall trees decreases.

Brown creepers may be cavity nesters, sometimes nesting in natural cavities and old woodpecker holes, but generally they make their nests between the loose bark and the trunks of large dead trees (Bent 1948).

Hughes (1985) found brown creepers associated with high volume old-growth stands of western hemlock (Tsuga heterophylla) and Sitka spruce (Picea sitchensis) in Southeast Alaska. These forests provided the components which are considered the optimum habitat for brown creepers (i.e., large diameter, tall trees). Slightly more than 0.1 of the number of brown creepers observed in stands with greater than 30,000 board feet/acre were observed in stands with 20,000-30,000 board feet/acre (i.e., mid-volume) (Hughes 1985). Other habitats in Southeast Alaska were not considered to provide habitat for brown creepers. Studies of the brown creepers' response to timber harvest have shown reductions of brown creeper populations from old-growth forests to clearcuts (Franzreb 1977; Franzreb and Ohmart 1978; Scott and Gottfried 1983; Medin 1985).

Habitat Suitability and Capability

Winter habitat has been suggested as the limiting factor for cavity nesting birds including the brown creeper (Raphael and White 1984; Haapanen 1965, p. 190). An interagency task group developed a winter habitat capability model for brown creepers in Southeast Alaska (Suring et al. 1988). This habitat capability model identifies the following variables in describing the value of habitats for brown creepers:

Vegetation. The successional stage of the forest vegetation has a direct relationship to the quantity and quality of brown creeper winter habitats. Old-growth forests receive the highest brown creeper use. Higher volume classes have been found to receive higher use by than lower volume classes.

Elevation. Lower elevations are better winter habitat and receive higher use than higher elevations

Patch Size and Corridors. Brown creepers have been identified as a species which shows a habitat/use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 15 acres in size, and use declines with decreasing patch size and becomes zero when patches are less than one acre (Figure 3-89). Patch size includes the acres of all old-growth conifer stands greater than or equal to volume class 5. Specific vegetative corridor requirements have not been identified for the brown creeper (reference July 31 and August 1, 1989 interagency workshop).

Figure 3-90 displays the interrelationships of vegetation and elevation on the habitat suitability for brown creepers. Habitats with the highest value receive a Habitat Suitability Index of 1.0 and are capable of supporting an average of [illegible] brown creepers per square mile of habitat.

Human Disturbance and Mortality Factors

Reductions in habitat suitability and capability due to disturbance and mortality caused by humans have not been identified for the brown creeper.

Viable Populations

To maintain populations "well distributed" within their occupied range on the islands, Alaska Department of Fish and Game "wildlife analysis areas" were identified as geographic units that would recognize and take into account the distribution of brown creepers among the islands of Southeast Alaska. To maintain population viability within the planning area, maintain habitat to support 50 animals within each of the wildlife analysis areas (reference interagency meeting records of September 26, 1988 and January 6, 1989).

FIGURE 3-89

EFFECT OF PATCH SIZE ON THE SUITABILITY AND CAPABILITY OF HABITATS TO SUPPORT BROWN CREEPERS.

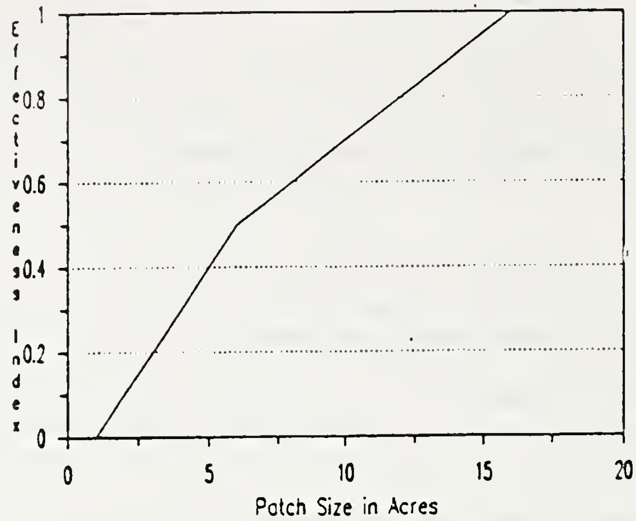
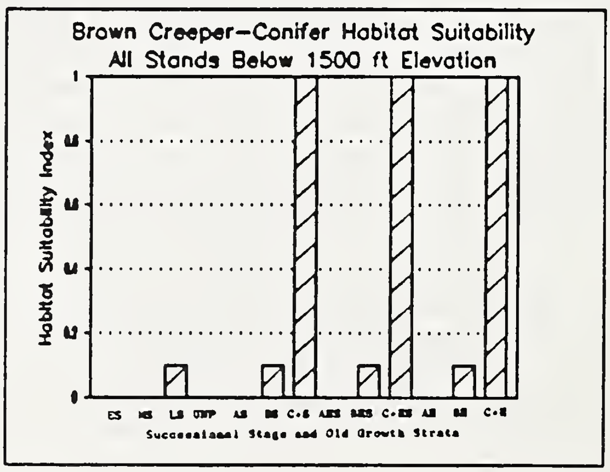


FIGURE 3-90

WINTER HABITAT SUITABILITY FOR BROWN CREEPERS IN SOUTHEAST ALASKA. (Stand age and strata class definitions are as follows: ES= early successional stage, 0-25 years; MS= middle successional stage, 25-150 years; LS= late successional stage, 150-200 years; UNP= unproductive old-growth forest; S= productive old-growth spruce stands; HS= productive old-growth hemlock/spruce stands; H= productive old-growth hemlock stands; Cot= cottonwood stands; A= strata class A stands; B= strata class B stands; C+= strata class C & D stands). Source: Suring et al. 1988



VANCOUVER CANADA GOOSE

Distribution

Vancouver Canada geese are distributed throughout the Alexander Archipelago of Southeast Alaska. The U.S. Fish and Wildlife Service estimates a resident population of 10,000 birds. Breeding range for this bird extends from Cross Sound near Glacier Bay south to Dixon Entrance and possibly into British Columbia (Hanson 1962). This population is relatively non-migratory with only two percent of the birds that nest in Southeast Alaska migrating out of the area (Ratti and Timm 1979). The majority of the birds move only locally between nesting, brood rearing, molting, and winter concentration areas.

Literature Review

Vancouver Canada geese nest primarily in or adjacent to relatively dense forested habitats (Van Horn et al. 1979; Mickelson 1984). Lebeda and Ratti (1983) reported that 22 of 26 goose nests found on Admiralty Island were in forested habitat, one on top of a 30-foot Sitka spruce (Picea sitchensis) snag. Of the remaining nests, two were found on the forested edge of lakes, one on an island in a muskeg, and one on a peninsula of a beaver pond. Both nesting and brood rearing activities occurred in forested habitats similar to that classified as poorly drained F4 and F5 soil types by the USDA Forest Service (Stephens et al. 1968). F4 soils are intermediate, in terms of productivity and produce timber of commercial value, whereas F5 soils do not produce timber of commercial value because of excess moisture. Warner et al. (1980) also found an association between nesting and brood rearing habitat and poorly drained soils. In that study, muskeg forests had the highest number of observations of geese per hour, although all forest communities appeared to be used to some extent.

In the study by Lebeda and Ratti (1983) on Admiralty Island, the average canopy cover above the nest site was 88 percent, and decreased to 66 percent at a distance of 16 feet from the nest. Twenty-five of the 26 nests were found at tree bases. Shore pine (Pinus contorta) and western hemlock (Tsuga heterophylla) were the most common nest trees. Average diameters at breast height of nest trees were 8.7 inches for shore pine and 9.4 inches for western hemlock. Vegetative ground cover averaged 97 percent within 3.3 feet of the nest.

Nests located on Admiralty Island were an average of 1,170 feet from tidal water (locations ranged from 240 to 2,625 feet) (Lebeda 1980). All nests located by Harrington (1977) in a survey on Heceta Island were within 2,640 feet of open water. Nests on Admiralty Island were found an average of 102 feet from fresh water, but were not associated with large bodies of open water such as lakes, ponds, or bays. Most forest water associated with nest sites was surface water on poorly drained soils.

Forested habitats were extensively used for brood rearing as well as for nesting. Lebeda and Ratti (1983) reported that 85 percent of the radio locations of goslings were in forested habitat an average of 600 feet from the forest edge. Nesting and brood rearing habitats were very similar. No significant differences were found in vegetative composition, vegetative density board readings, or canopy cover between nesting and brood rearing habitats (Lebeda and Ratti 1983).

Broods apparently rarely use open water. Birds that were observed along beaches and lake shorelines on Admiralty Island preferred the forested habitats for escape to open water (Lebeda and Ratti 1983).

With increased age of the goslings, habitat use shifted to forest edge and intertidal zones and away from forest interiors (Lebeda and Ratti 1983).

During the Admiralty Island study, the American yellow skunk cabbage (Lysichiton americanum) was found to be the most important food consumed during nesting and brood rearing (Lebeda and Ratti 1983). Skunk cabbage--with the entire leaf, exclusive of the midrib, being consumed--accounted for 24 percent of their diet. Fecal contents of goslings indicated consumption of blueberries (Vaccinium spp.). Plant matter comprised the bulk of food items used; only traces of invertebrates were found in the food samples (Lebeda and Ratti 1983). Warner et al. (1980) reported heavy foraging by Vancouver Canada Geese on sedges and grasses in addition to skunk cabbage on Chichagof Island.

These studies in Southeast Alaska have shown that habitat relationships of Vancouver Canada geese are unique among all subspecies of Canada geese (Lebeda and Ratti 1983; Mickelson 1984). These birds have been reported as using forested habitats for nesting and brood rearing, placing nests in trees and using trees for perches during incubation, and relying primarily on forest understory plant species for forage during nesting and brood rearing.

There is little specific information on the effect of roads and/or human disturbance on nesting and brood rearing by Vancouver Canada geese. However, Livezey (1978) observed a correlation between number of geese observed per day on 19 lakes and distance classes from lake to road.

Habitat Suitability and Capability

Hanson (1962) indicated that nesting and brood rearing is probably the most limiting habitat factor. However, knowledge of year-around goose habitat requirements is very limited, and additional research and information may indicate other limiting habitat factors (such as wintering habitats). Nesting and brood rearing habitat are potentially affected by various Forest management activities. An interagency task group developed a habitat capability model for nesting and brood rearing habitat (Doyle et al. 1988). The habitat capability model identifies the following variables in describing the value of nesting and brood rearing habitats:

Vegetation. Estuaries, non-forested wetlands, and certain old-growth forest types are used by Vancouver Canada geese for nesting and brood rearing. Plant associations are used to identify which old-growth forest types have the highest value. Table 3-170 displays the suitability of forested plant associations, estuaries and non-forested wetlands for nesting and brood rearing. Habitats with the highest value are given a Habitat Suitability Index rating of 1.0; as the value of the various habitat types declines for geese, the Habitat Suitability Index rating declines.

Elevation/Location. Most nesting and brood rearing occur within 2,600 feet of uncontained river channels, lakes, and salt water.

Patch Size and Corridors. Although Vancouver Canada geese probably respond to some minimum level of patch size, adequate information is not available to develop the patch size relationship. Vegetative corridor requirements have not been identified (reference July 31 and August 1, 1989 interagency workshop).

TABLE 3-170
VANCOUVER CANADA GOOSE HABITAT SUITABILITY INDEX RATINGS FOR OLD-GROWTH FORESTED PLANT SERIES AND PLANT ASSOCIATIONS, ESTUARIES, NON-FORESTED WETLANDS, AND CONIFER SUCCESSIONAL STAGES.

Series	Plant Associations	HSI	Population per sq. mile
Shorepine	Shorepine Crowberry	.6	3.6
Mountain Hemlock	Mountain Hemlock/Blueberry-Cassiope	.4	2.4
	Mountain Hemlock/Blueberry-Copper Bush	.5	3.0
	Mountain Hemlock/Blueberry/Deer Cabbage	.5	3.0
	Mountain Hemlock/Blueberry	.4	2.4
Mixed Conifer	Mixed Conifer/Salal/Deer Cabbage	.5	3.0
	Mixed Conifer/Blueberry-Salal/Skunk Cabbage	.6	3.6
	Mixed Conifer/Salal/Skunk Cabbage	.8	4.8
	Mixed Conifer/Blueberry-Salal	.5	3.0
	Mixed Conifer/Salal	.3	1.8
	Mixed Conifer/Copperbush		
	Mixed Conifer/Blueberry/Deer Cabbage	.8	4.8
	Mixed Conifer/Skunk Cabbage-Lady Fern	.8	4.8
	Mixed Conifer/Blueberry/Skunk Cabbage	1.0	6.0
	Mixed Conifer/Blueberry	.4	2.4
Western Hemlock-Alaska Cedar (WH-AC)	WH-AC/Blueberry/Skunk Cabbage	.8	4.8
	WH-AC/Blueberry-Devil's Club	.3	1.8
	WH-AC/Blueberry	.4	2.4
Western Hemlock-Red Cedar (WH-RC)	WH-RC/Blueberry-Salal/Skunk Cabbage		
	WH-RC/Salal/Skunk Cabbage	.6	3.6
	WH-RC/Blueberry-Salal	.3	1.8
	WH-RC/Salal	.3	1.8
	WH-RC/Devil's Club/Skunk Cabbage	.6	3.6
	WH-RC/Blueberry/Skunk Cabbage	.8	4.8
	WH-RC/Devil's Club/Sword Fern	.3	1.8
	WH-RC/Sword Fern	0	0
	WH-RC/Blueberry/Devil's Club	.4	2.4
	WH-RC/Blueberry	.3	1.8
Sitka Spruce	Sitka Spruce/Alder	.6	3.6
	Sitka Spruce/Devil's Club-Salmonberry	.2	1.2
	Sitka Spruce/Devil's Club/Skunk Cabbage	.6	3.6
	Sitka Spruce/Blueberry-Devil's Club	.3	1.8
	Sitka Spruce/Devil's Club/Enchanter's Nightshade	.2	1.2
	Sitka Spruce/Devil's Club	.2	1.2
	Sitka Spruce/Salmonberry		
	Sitka Spruce/Blueberry/Skunk Cabbage	.7	4.2
	Sitka Spruce/Pacific Reedgrass	.4	2.4
	Sitka Spruce/Blueberry	.3	1.8

TABLE 3-170 (Continued)
VANCOUVER CANADA GOOSE HABITAT SUITABILITY INDEX RATINGS FOR OLD-GROWTH FORESTED PLANT SERIES AND PLANT ASSOCIATIONS, ESTUARIES, NON-FORESTED WETLANDS, AND CONIFER SUCCESSIONAL STAGES

Series	Plant Associations	HSI	Population per sq. mile
Western Hemlock	Western Hemlock/Devil's Club/Skunk Cabbage	.6	3.6
	Western Hemlock/Blueberry/Skunk Cabbage	1.0	6.0
	Western Hemlock/Devil's Club/Swordfern	.2	1.2
	Western Hemlock/Blueberry-Devil's Club-Deep, Well Drained Soils	.3	1.8
	Western Hemlock/Blueberry-Devil's Club	.3	1.8
	Western Hemlock/Devil's Club	.2	1.2
	Western Hemlock/Blueberry/Shield Fern	.3	1.8
	Western Hemlock/Blueberry	.4	2.4
Non-Forested Wetlands	Moss-lichen Wetlands (sphagnum muskegs)	.3	1.8
	Emergent Wetlands (short & tall sedge muskegs)	.3	1.8
Estuaries		1.0	6.0
Conifer Successional Stages	Clearcuts (0-25 years)	0	0
	Second Growth (25-200 years)	0	0

Source: Doyle et al. 1988

Human Disturbance and Mortality Factors

Based on the solitary nature of Vancouver Canada geese and avoidance of disturbance (Hanson 1962), proximity of roads and associated disturbance is included in the evaluation of habitat suitability and capability. Livezey (1978) observed an apparent relationship between number of geese seen and distance to roads. A weak, but significant, correlation was calculated from data presented in this report between number of geese observed per day on 19 lakes and distance classes from lake to road. Of eight lakes where two or more geese were observed per day all were greater than 660 feet from an active road. Goose habitat within 330 feet of arterial roads and forest or State highways are given no value for nesting or brood rearing habitat (Doyle et al. 1988).

Viable Populations

To maintain viable populations well distributed throughout Southeast Alaska, eight geographic areas were recommended: Game Management Units 1A, 2, 1B combined with 3, 1C combined with Admiralty Island, 5A (Yakutat), Chichagof Island, Baranof Island, Chilkat Range combined with both 1D and Glacier Bay National Park. To maintain population viability within the planning area, maintain habitat to support 125 geese within each of the eight geographic areas (reference interagency meeting records of September 26, 1988 and January 6, 1989).

MOOSE

Moose have not been designated a MIS; however, at the request of the Alaska Department of Fish and Game, information on moose habitats and populations will be displayed as part of the Forest Plan Revision.

Distribution

Moose migrated down the major river systems from Canada into Southeast Alaska during the early 20th century, and moose were first reported at Yakutat between 1930 to 1932. All moose in Southeast result from these natural migrations except those at Berner's Bay; they were transplanted there in the mid-1960's. Moose were also transplanted into the Chickamin River valley, because suitable habitat was limited, this transplant did not result in an established herd. Moose may still be expanding their range in Southeast Alaska, with reports of moose being seen on Chichagof and Prince of Wales Islands. Given the short time they have been in Southeast, their distribution will probably increase. Currently, moose are present in the following Value Comparison Units (VCU's): 9, 12-17, 19, 20, 25, 41, 46, 55, 57, 65, 66, 68-77, 79-90, 95-123, 352-395, 428-434, 435, 436, 438, 441, 442, 445, 447-454, 463, 464, 468-471, 475-480, 482-487, 489-505, 508-524, 782, 786, 788, 790, 791, 793-796.

The Alaska Department of Fish and Game is currently preparing a "Strategic Plan for Management of Moose in Region 1, Southeast Alaska, 1990-94". In the public review of the draft plan, they present information on estimated population status for nine moose management areas on the Forest (see table 3-171).

TABLE 3-171
ESTIMATED POPULATION STATUS FOR NINE MOOSE MANAGEMENT AREAS ON THE FOREST.

Area	Estimated 1988 Post-hunt Moose Numbers
Unuk/Chickamin	35
Stikine River	450
Thomas Bay	200
Unit 3	No information
Taku River	150
Berners Bay	90
Chilkat Range	150
Yakutat Forelands	835
Nunatak Bench	No information

CURRENT OLD GROWTH ACREAGES

Old-growth forests are an important habitat component for most of the wildlife management indicator species. Having an understanding of the current old-growth vegetative condition of the Forest is important to understanding the current habitat capability of the Forest for the management indicator species. The following discussion and tables provide an overview of the old growth acreages; for additional background on old growth definitions, refer to the Old Growth Forest Section of the AMS.

Table 3-172 provides a general summary of the old-growth acres on the Tongass National Forest. There are a total of 8.7 million acres of old growth, with 3.6 million classified as unproductive conifer old growth, 5.08 million classified as productive conifer old growth, and 8.8 thousand classified as cottonwood old growth.

TABLE 3-172
ACRES OF CONIFER AND COTTONWOOD OLD GROWTH FORESTS ON THE TONGASS NATIONAL FOREST.

Unproductive Conifer Old Growth (includes shorepine, and other unproductive acres of cedar, western and mountain hemlock, hemlock/spruce, and spruce)	3,566,317 acres
Productive Conifer Old Growth (includes productive cedar, western and mountain hemlock, hemlock/spruce, and spruce)	5,084,114 acres
Cottonwood	8,868 acres
Total Old Growth	8,659,299 acres

Source: Revision database, December 19, 1989.

The GIS database does not contain species information for the unproductive conifer old-growth acres. The productive conifer old-growth acres can be divided into four species groups, and each species group can be divided into four strata classes. Table 3-173 displays this information. Of the 5.08 million acres of productive old-growth forest, one percent is cedar, 60 percent is western and mountain hemlock, 38 percent is hemlock/spruce, and 2 percent is spruce.

The four strata classes comprise the following percentages of the 5.08 million acres: Strata A - 50 percent, Strata B - 39 percent, Strata C - 9 percent, and Strata D - 2 percent.

TABLE 3-173
PRODUCTIVE CONIFER OLD GROWTH ACRES BY SPECIES AND STRATA CLASSES.

	Strata				Total Each
Species	A	B	C	D	Species
Cedar	34,912	1,000	-	-	35,912
Western and Mountain Hemlock	1,896,339	993,335	136,521	8,601	3,034,796
Hemlock/Spruce	573,910	972,035	295,563	72,577	1,914,085
Spruce	23,360	36,961	29,512	9,652	99,485
Total Each Strata	2,528,521	2,003,331	461,596	90,830	5,084,278

Source: Revision database, December 19, 1989.

Table 3-174 displays productive conifer old growth acres by seven landscape locations:

Estuary Fringe. This is defined as the area of land within a 1,000 foot horizontal distance inland from the Revision GIS shoreline around all identified estuary areas in the Revision GIS database.

Coast or Beach Fringe. This is defined as the area of land within a 500 foot horizontal distance inland from the Revision GIS shoreline along the entire coastline, but not including the area of land already within the estuary fringe.

Riparian. This is defined as a minimum 100 foot wide zone along both sides of all streams that have been digitized in the Revision GIS database; some stream channel types have a 150 foot wide zone along both sides; if riparian soil mapping units are wider than the 100 or 150 foot zone, then the width of the soil mapping unit is the width of the zone. The riparian unit does not include any acres already included within the estuary fringe or the beach fringe.

Upland less than 800 feet in elevation. This is defined as all upland areas below 800 feet, but not including any acres already included within the estuary fringe, beach fringe, or riparian units.

Upland from 800 to 1,500 feet in elevation. This is defined as all upland areas from 800 feet to 1,500 feet in elevation, but not including any acres within the previous units if there is overlap.

Subalpine. This is defined as all upland areas from 1,500 feet in elevation to 2,000 feet, but not including any acres within the previous units if there is overlap.

Alpine. This is defined as all upland areas above 2,000 feet in elevation, but not including any acres within the previous units if there is overlap.

TABLE 3-174

PRODUCTIVE CONIFER OLD GROWTH ACRES BY LANDSCAPE POSITION. 1/

Species	Strata	Estuary Fringe	Beach Fringe	Riparian	Upland <800 ft	Upland 800-1500 ft	Sub-alpine	Alpine	Totals
Cedar	A	260	5,507	2,183	22,402	4,260	260	40	34,912
	B	40	60	20	620	260	0	0	1,000
Western and	A	30,468	107,075	110,448	804,118	542,609	223,109	78,512	1,896,339
Mountain	B	21,549	58,559	70,242	445,968	305,979	76,279	14,759	993,335
Hemlock	C	2,221	5,863	10,783	69,130	41,411	6,515	598	136,521
	D	80	481	660	5,299	1,961	100	20	8,601
Hemlock/Spruce	A	21,531	64,288	47,713	239,004	147,895	43,892	9,587	573,910
	B	39,985	91,967	94,969	416,132	255,039	60,112	13,831	972,035
	C	8,363	21,196	35,541	142,679	74,109	12,675	1,000	295,563
	D	1,460	5,500	9,283	39,189	14,144	2,721	280	72,577
Spruce	A	1,300	1,609	3,439	6,895	7,400	2,299	418	23,360
	B	3,382	4,538	6,813	14,471	6,440	939	378	36,961
	C	1,939	2,255	9,856	11,241	3,701	460	60	29,512
	D	200	616	2,760	4,978	1,058	40	0	9,652
Total		132,778	369,514	404,710	2,222,126	1,406,266	429,401	119,483	5,084,278

Source: Revision database, December 19, 1989.

1/ Estuary fringe and riparian acres do not include Wilderness areas, because GIS data was not available to identify estuaries and riparian areas in Wilderness. The acres which would have been in estuary fringe and riparian areas in Wilderness are included in the upland old-growth acres.

Table 3-175 summarizes the amount of old-growth by type by Administrative Area. Table 3-176 displays the distribution of old growth throughout the 50 geozones. All geozones, except for geozones C17, C22, and C24, which are located at Yakutat, currently contain old-growth forests.

TABLE 3-175

PERCENTAGE OF OLD-GROWTH TYPES BY ADMINISTRATIVE AREA.

	Administrative Area		
	Chatham	Stikine	Ketchikan
Productive old-growth cedar	-	3	97
Productive old-growth spruce	72	11	17
Productive old-growth Western and Mountain Hemlock	27	27	46
Productive old-growth hemlock/spruce	53	21	26
Old-growth cottonwood 1/			

1/ All of the old-growth cottonwood acres are located in geozones on the mainland, and are primarily associated with riparian areas.

TABLE 3-176
ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

		Geozone							
Species	Strata	C01	C02	C03	C04	C05	C06	C07	C09
Cottonwood		0	0	0	0	0	0	0	0
Unproductive Conifer		25,093	33,265	19,018	2,579	29,391	54,004	6,463	48,910
Productive Conifer									
Cedar	A	0	0	0	0	0	0	0	0
	B	0	0	0	0	0	0	0	0
Western and	A	7,543	47,569	5,777	7,258	7,431	39,605	3,079	11,686
Mountain	B	1,261	12,281	320	3,259	460	7,155	520	1,801
Hemlock	C	0	760	0	0	0	80	0	0
	D	0	0	0	0	0	0	0	0
Hemlock/Spruce	A	18,506	29,632	8,759	3,119	18,119	44,540	20	34,547
	B	16,068	45,741	2,880	4,939	11,644	49,687	60	29,850
	C	2,300	11,668	0	1,040	2,138	5,573	0	520
	D	0	0	0	0	0	20	0	0
Spruce	A	1,040	1,341	540	140	459	2,379	0	741
	B	2,221	4,524	1,920	140	939	5,535	0	1,041
	C	1,341	4,823	80	300	460	4,553	0	1,563
	D	0	140	0	0	0	560	0	0
Total Productive Conifer		50,280	158,479	20,276	20,195	41,650	159,687	3,679	81,749
Total Cedar		0	0	0	0	0	0	0	0
Total Hemlock		8,804	60,610	6,097	10,517	7,891	46,840	3,599	13,487
Total Hemlock/Spruce		36,874	87,041	11,639	9,098	31,901	99,820	80	64,917
Total Spruce		4,602	10,828	2,540	580	1,858	13,027	0	3,345
TOTAL STRATA A		27,089	78,542	15,076	10,517	26,009	86,524	3,099	46,974
TOTAL STRATA B		19,550	62,546	5,120	8,338	13,043	62,377	580	32,692
TOTAL STRATA C		3,641	17,251	80	1,340	2,598	10,206	0	2,083
TOTAL STRATA D		0	140	0	0	0	580	0	0
% Cedar		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% Hemlock		17.5	38.2	30.1	52.1	18.9	29.3	97.8	16.5
% Hemlock/Spruce		73.3	54.9	57.4	45.1	76.6	62.5	2.2	79.4
% Spruce		9.2	6.8	12.5	2.9	4.5	8.2	0.0	4.1
% STRATA A		53.9	49.6	74.4	52.1	62.4	54.2	84.2	57.5
% STRATA B		38.9	39.5	25.3	41.3	31.3	39.1	15.8	40.0
% STRATA C		7.2	10.9	0.4	6.6	6.2	6.4	0.0	2.5
% STRATA D		0.0	0.1	0.0	0.0	0.0	0.4	0.0	0.0

TABLE 3-176 continued
ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

		Geozone							
Species	Strata	C10	C11	C12	C13	C14	C15	C16	C17
Cottonwood		0	0	0	0	0	0	40	0
Unproductive Conifer		110,456	26,252	87,105	80,596	29,289	196,666	19,057	0
Productive Conifer									
Cedar	A	0	60	0	20	0	0	0	0
	B	0	0	0	0	0	0	0	
Western and	A	33,495	8,558	5,765	30,984	17,503	174,604	2,280	0
Mountain	B	3,249	1,561	480	4,981	1,643	113,398	700	0
Hemlock	C	60	0	0	40	0	21,983	60	0
	D	0	0	0	0	0	380	0	0
Hemlock/Spruce	A	62,534	12,394	23,150	16,446	5,300	48,917	1,460	0
	B	33,087	7,681	6,083	10,635	7,711	113,336	2,421	0
	C	1,665	440	1,619	1,720	862	61,094	700	0
	D	20	0	0	0	0	5,516	0	0
Spruce	A	790	318	800	60	479	719	6,360	0
	B	2,142	279	981	80	520	2,418	940	0
	C	420	100	1,340	0	0	1,939	400	0
	D	40	0	0	0	0	1,079	0	0
Total Productive Conifer		137,502	31,391	40,218	64,966	34,018	545,383	15,321	0
Total Cedar		0	60	0	20	0	0	0	0
Total Hemlock		36,804	10,119	6,245	36,005	19,146	310,365	3,040	0
Total Hemlock/Spruce		97,306	20,515	30,852	28,801	13,873	228,863	4,581	0
Total Spruce		3,392	697	3,121	140	999	6,155	7,700	0
TOTAL STRATA A		96,819	21,330	29,715	47,510	23,282	224,240	10,100	0
TOTAL STRATA B		38,478	9,521	7,544	15,696	9,874	229,152	4,061	0
TOTAL STRATA C		2,145	540	2,959	1,760	862	85,016	1,160	0
TOTAL STRATA D		60	0	0	0	0	6,975	0	0
% Cedar		0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0
% Hemlock		26.8	32.2	15.5	55.4	56.3	56.9	19.8	0.0
% Hemlock/Spruce		70.8	65.4	76.7	44.3	40.8	42.0	29.9	0.0
% Spruce		2.5	2.2	7.8	0.2	2.9	1.1	50.3	0.0
% STRATA A		70.4	67.9	73.9	73.1	68.4	41.1	65.9	0.0
% STRATA B		28.0	30.3	18.8	24.2	29.0	42.0	26.5	0.0
% STRATA C		1.6	1.7	7.4	2.7	2.5	15.6	7.6	0.0
% STRATA D		0.0	0.0	0.0	0.0	0.0	1.3	0.0	0.0

TABLE 3-176 continued

ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

Species	Strata	Geozone C18	C20	C21	C22	C23	C24	C25	[illegible]
Cottonwood		0	0	180	0	6,308	0	0	0
Unproductive Conifer		32,993	23,343	28,335	0	148,460	0	36,699	12,662
Productive Conifer									
Cedar	A	0	0	0	0	0	0	20	0
	B	0	0	0	0	0	0	0	0
Western and	A	21,713	18,501	33,499	0	59,598	0	36,004	7,402
Mountain	B	15,085	10,427	10,179	0	14,491	0	10,315	40
Hemlock	C	800	2,022	1,199	0	2,257	0	5,324	0
	D	0	0	0	0	0	0	19	0
Hemlock/Spruce	A	3,767	2,603	9,964	0	34,550	0	23,904	1,300
	B	11,374	7,226	12,540	0	39,288	0	70,200	5,601
	C	4,214	4,203	3,661	0	6,247	0	6,326	1,500
	D	0	200	100	0	140	0	356	680
Spruce	A	199	0	320	0	3,093	0	318	0
	B	676	300	300	0	3,448	0	981	0
	C	379	40	80	0	1,200	0	1,042	40
	D	0	20	20	0	0	0	0	0
Total Productive Conifer		58,207	45,542	71,862	0	164,312	0	154,809	16,563
Total Cedar		0	0	0	0	0	0	20	0
Total Hemlock		37,598	30,950	44,877	0	76,346	0	51,662	7,442
Total Hemlock/Spruce		19,355	14,232	26,265	0	80,225	0	100,786	9,081
Total Spruce		1,254	360	720	0	7,741	0	2,341	40
TOTAL STRATA A		25,679	21,104	43,783	0	97,241	0	60,246	8,702
TOTAL STRATA B		27,135	17,953	23,019	0	57,227	0	81,496	5,641
TOTAL STRATA C		5,393	6,265	4,940	0	9,704	0	12,692	1,540
TOTAL STRATA D		0	220	120	0	140	0	375	680
% Cedar		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
% Hemlock		64.6	68.0	62.4	0.0	46.5	0.0	33.4	44.9
% Hemlock/Spruce		33.3	31.3	36.5	0.0	48.8	0.0	65.1	54.8
% Spruce		2.2	0.8	1.0	0.0	4.7	0.0	1.5	0.2
% STRATA A		44.1	46.3	60.9	0.0	59.2	0.0	38.9	52.5
% STRATA B		46.6	39.4	32.0	0.0	34.8	0.0	52.6	34.1
% STRATA C		9.3	13.8	6.9	0.0	5.9	0.0	8.2	9.3
% STRATA D		0.0	0.5	0.2	0.0	0.1	0.0	0.2	4.1

TABLE 3-176 continued
ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

		Geozone							
Species	Strata	K02	K04	K05	K06	K07	K08	K09	K[illegible]
Cottonwood		0	0	0	0	0	0	0	
Unproductive Conifer		34,707	174,218	79,557	208,995	118,478	148,964	39,845	[illegible]
Productive Conifer									
Cedar	A	1,046	2,100	879	7,401	8,519	5,475	476	518
	B	0	80	0	320	160	160	0	0
Western and	A	1,970	76,916	44,537	105,757	42,427	55,271	33,468	30,522
Mountain	B	865	93,785	36,122	91,536	19,629	30,899	22,148	15,178
Hemlock	C	0	9,444	1,301	24,862	2,943	4,440	2,718	1,841
	D	0	80	0	2,177	380	400	100	0
Hemlock/Spruce	A	1,227	4,823	1,901	5,826	2,020	6,653	2,848	958
	B	1,990	34,042	10,119	48,550	14,293	20,863	15,217	3,324
	C	140	11,223	3,579	37,413	14,718	15,738	5,131	1,666
	D	0	820	460	15,054	14,577	12,407	1,016	319
Spruce	A	20	0	0	20	60	320	20	0
	B	80	140	60	420	658	879	419	80
	C	0	141	100	1,461	1,054	1,439	259	60
	D	0	120	0	2,756	1,376	1,821	359	0
Total Productive Conifer		7,338	233,714	99,058	343,553	122,814	156,765	84,179	54,466
Total Cedar		1,046	2,180	879	7,721	8,679	5,635	476	518
Total Hemlock		2,835	180,225	81,960	224,332	65,379	91,010	58,434	47,541
Total Hemlock/Spruce		3,357	50,908	16,059	106,843	45,608	55,661	24,212	6,267
Total Spruce		100	401	160	4,657	3,148	4,459	1,057	140
TOTAL STRATA A		4,263	83,839	47,317	119,004	53,026	67,719	36,812	31,998
TOTAL STRATA B		2,935	128,047	46,301	140,826	34,740	52,801	37,784	18,582
TOTAL STRATA C		140	20,808	4,980	63,736	18,715	21,617	8,108	3,567
TOTAL STRATA D		0	1,020	460	19,987	16,333	14,628	1,475	319
% Cedar		14.3	0.9	0.9	2.2	7.1	3.6	0.6	1.0
% Hemlock		38.6	77.1	82.7	65.3	53.2	58.1	69.4	87.3
% Hemlock/Spruce		45.7	21.8	16.2	31.1	37.1	35.5	28.8	11.5
% Spruce		1.4	0.2	0.2	1.4	2.6	2.8	1.3	0.3
% STRATA A		58.1	35.9	47.8	34.6	43.2	43.2	43.7	58.7
% STRATA B		40.0	54.8	46.7	41.0	28.3	33.7	44.9	34.1
% STRATA C		1.9	8.9	5.0	18.6	15.2	13.8	9.6	6.5
% STRATA D		0.0	0.4	0.5	5.8	13.3	9.3	1.8	0.6

TABLE 3-176 continued
ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

		Geozone							
Species	Strata	K11	K12	K13	K14	K15	S01	S02	S03
Cottonwood		0	0	500	0	0	0	0	0
Unproductive Conifer		41,425	36,872	679,278	47,018	8,762	62,981	23,613	148,172
Productive Conifer									
Cedar	A	1,102	300	2,139	4,018	0	80	0	239
	B	60	0	80	0	0	80	0	0
Western and	A	30,938	20,813	321,464	15,045	8,900	48,916	29,104	62,445
Mountain	B	37,126	16,466	138,034	4,697	7,703	47,751	16,963	25,622
Hemlock	C	11,648	1,081	13,819	520	977	7,544	782	1,360
	D	2,986	0	440	40	60	1,060	0	0
Hemlock/Spruce	A	984	1,181	32,106	439	1,758	9,388	7,810	5,945
	B	10,911	5,127	75,406	3,416	2,354	49,015	16,769	17,450
	C	15,359	600	13,662	2,459	279	17,439	3,694	5,073
	D	7,792	220	4,698	1,160	0	4,961	161	419
Spruce	A	0	0	100	0	0	339	0	20
	B	321	20	480	20	0	917	80	60
	C	281	40	720	239	0	857	60	60
	D	180	0	680	100	0	100	20	0
Total Productive Conifer		119,688	45,848	603,828	32,153	22,031	188,447	75,443	118,693
Total Cedar		1,162	300	2,219	4,018	0	160	0	239
Total Hemlock		82,698	38,360	473,757	20,302	17,640	105,271	46,849	89,427
Total Hemlock/Spruce		35,046	7,128	125,872	7,474	4,391	80,803	28,434	28,887
Total Spruce		782	60	1,980	359	0	2,213	160	140
TOTAL STRATA A		33,024	22,294	355,809	19,502	10,658	58,723	36,914	68,649
TOTAL STRATA B		48,418	21,613	214,000	8,133	10,057	97,763	33,812	43,132
TOTAL STRATA C		27,288	1,721	28,201	3,218	1,256	25,840	4,536	6,493
TOTAL STRATA D		10,958	220	5,818	1,300	60	6,121	181	419
% Cedar		1.0	0.7	0.4	12.5	0.0	0.1	0.0	0.2
% Hemlock		69.1	83.7	78.5	63.1	80.1	55.9	62.1	75.3
% Hemlock/Spruce		29.3	15.5	20.8	23.2	19.9	42.9	37.7	24.3
% Spruce		0.7	0.1	0.3	1.1	0.0	1.2	0.2	0.1
% STRATA A		27.6	48.6	58.9	60.7	48.4	31.2	48.9	57.8
% STRATA B		40.5	47.1	35.4	25.3	45.6	51.9	44.8	36.3
% STRATA C		22.8	3.8	4.7	10.0	5.7	13.7	6.0	5.5
% STRATA D		9.2	0.5	1.0	4.0	0.3	3.2	0.2	0.4

TABLE 3-176 continued
ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

		Geozone							
Species	Strata	S04	S05	S06	S07	S08	S09	S10	S11
Cottonwood		0	0	0	0	0	20	0	0
Unproductive Conifer		34,684	46,441	90,354	46,740	85,950	170,532	76,315	5,539
Productive Conifer									
Cedar	A	0	0	358	0	0	0	80	60
	B	0	0	61	0	0	0	0	0
Western and	A	31,223	31,560	47,489	27,120	37,412	112,693	51,815	9,286
Mountain	B	15,030	11,446	17,896	12,621	14,385	46,328	15,752	21,635
Hemlock	C	3,221	2,178	1,341	780	2,996	1,720	1,681	1,280
	D	80	40	0	0	160	0	40	0
Hemlock/Spruce	A	1,601	3,019	10,979	5,080	19,056	5,420	21,877	758
	B	5,324	4,017	24,352	11,680	23,838	21,722	23,042	11,397
	C	1,501	1,678	3,721	2,100	4,014	3,500	5,048	2,418
	D	60	200	381	20	342	0	340	0
Spruce	A	60	0	40	40	221	100	141	119
	B	20	60	220	0	160	20	481	159
	C	0	20	200	0	62	160	320	60
	D	0	0	60	0	0	0	220	0
Total Productive Conifer		58,120	54,218	107,098	59,441	102,646	191,663	120,837	46,872
Total Cedar		0	0	419	0	0	0	80	60
Total Hemlock		49,554	45,224	66,726	40,521	54,953	160,741	69,288	32,201
Total Hemlock/Spruce		8,486	8,914	39,433	18,880	47,250	30,642	50,307	14,273
Total Spruce		80	80	520	40	443	280	1,162	338
TOTAL STRATA A		32,884	34,579	58,866	32,240	56,689	118,213	73,913	10,223
TOTAL STRATA B		20,374	15,523	42,529	24,301	38,383	68,070	39,275	33,191
TOTAL STRATA C		4,722	3,876	5,262	2,880	7,072	5,380	7,049	3,458
TOTAL STRATA D		140	240	441	20	502	0	600	0
% Cedar		0.0	0.0	0.4	0.0	0.0	0.0	0.1	0.1
% Hemlock		85.3	83.4	62.3	68.2	53.5	83.9	57.3	68.7
% Hemlock/Spruce		14.6	16.4	36.8	31.8	46.0	16.0	41.6	30.5
% Spruce		0.1	0.1	0.5	0.1	0.4	0.1	1.0	0.7
% STRATA A		56.6	63.8	55.0	54.2	55.2	61.7	61.2	21.8
% STRATA B		35.1	28.6	39.7	40.9	37.4	35.5	32.5	70.8
% STRATA C		8.1	7.1	4.9	4.8	6.9	2.8	5.8	7.4
% STRATA D		0.2	0.4	0.4	0.0	0.5	0.0	0.5	0.0

TABLE 3-176 continued
ACRES OF OLD GROWTH FOREST BY SPECIES AND STRATA IN EACH GEOZONE.

Species	Strata	Geozone S12	S13	S14	TOTALS
Cottonwood		1,780	0	0	8,868
Unproductive Conifer		34,303	20,079	7,171	3,566,317
Productive Conifer					
Cedar	A	0	20	0	34,910
	B	0	0	0	1,001
Western and	A	20,996	9,899	8,346	1,896,186
Mountain	B	10,848	5,637	3,623	993,331
Hemlock	C	1,161	100	200	136,523
	D	20	140	0	8,602
Hemlock/Spruce	A	9,589	1,080	6,030	573,887
	B	18,479	4,980	6,315	972,044
	C	4,824	700	701	295,568
	D	0	140	0	72,579
Spruce	A	1,541	0	100	23,357
	B	1,301	20	501	36,961
	C	1,480	0	341	29,514
	D	0	0	0	9,651
Total Productive Conifer		70,239	22,716	26,157	5,084,114
Total Cedar		0	20	0	35,911
Total Hemlock		33,025	15,776	12,169	3,034,642
Total Hemlock/Spruce		32,892	6,900	13,046	1,914,078
Total Spruce		4,322	20	942	99,483
TOTAL STRATA A		32,126	10,999	14,476	2,528,340
TOTAL STRATA B		30,628	10,637	10,439	2,003,337
TOTAL STRATA C		7,465	800	1,242	461,605
TOTAL STRATA D		20	280	0	90,832
% Cedar		0.0	0.1	0.0	0.7
% Hemlock		47.0	69.4	46.5	59.7
% Hemlock/Spruce		46.8	30.4	49.9	37.6
% Spruce		6.2	0.1	3.6	2.0
% STRATA A		45.7	48.4	55.3	49.7
% STRATA B		43.6	46.8	39.9	39.4
% STRATA C		10.6	3.5	4.7	9.1
% STRATA D		0.0	1.2	0.0	1.8

Source: Revision database, December 19, 1989.

Table 3-177 provides a first approximation of old-growth acres by Society of American Foresters classification of forest cover types. At the present time, it is not possible to identify the acres for the lodgepole pine, coastal true fir/western hemlock, and western red cedar/western hemlock cover types because those species identifiers are not part of the GIS database. The acres for old growth lodgepole pine are included in the unproductive old-growth acres displayed in previous tables. The acres for old growth coastal true fir/western hemlock, and western red cedar/western hemlock are included in the old growth western hemlock and mountain hemlock acres at this time.

TABLE 3-177
FIRST APPROXIMATION OF OLD GROWTH ACRES BY SOCIETY OF AMERICAN FORESTERS CLASSIFICATION OF FOREST COVER TYPES.

Type Number	Cover Type	Acres	Comments
205	Mountain Hemlock	399,892	Includes all old-growth hemlock stands above 1,500 feet elevation; may include acres for types 226 and 227
218	Lodgepole Pine	unknown	Lodgepole pine is not a species identified in the GIS database
223	Sitka Spruce	99,483	Includes all old-growth spruce stands
224	Western Hemlock	2,634,904	Includes all old-growth hemlock stands below 1,500 feet elevation; includes acres for types 226 and 227
225	Western Hemlock/Sitka Spruce	1,914,085	Includes all old-growth hemlock/spruce stands
226	Coastal True Fir/Western Hemlock	unknown	Coastal true fir is a species not identified in the GIS database
227	Western Red Cedar/Western Hemlock	unknown	Western red cedar/western hemlock is not identified in the GIS database
228	Western Red Cedar	35,912	Includes all old-growth cedar stands

Source: Revision database, December 19, 1989.

Yakutat Situation: Timber stand exams indicate that most of the older stands at Yakutat are between 150 to 200 years of age. Defining old-growth as at least 200 years old, the stands at Yakutat would not be considered old growth. The stands also do not exhibit many of the other characteristics of old-growth stands; there are fewer snags and less woody debris than would be expected under old-growth stand conditions. Table 3-178 summarizes the acres of late successional forest at Yakutat.

TABLE 3-178
ACRES OF LATE SUCCESSIONAL FOREST BY SPECIES AND STRATA FOR GEOZONES AT YAKUTAT.

		Geozones			
Species	Strata	C17	C22	C24	Total
Cottonwood		40	0	0	40
Unproductive Conifer		5,984	13,686	24,351	44,021
Productive Conifer					
Cedar	A	0	0	0	0
	B	0	0	0	0
Hemlock	A	11,817	1,222	2,416	15,455
	B	1,401	100	199	1,700
	C	20	0	60	80
	D	0	0	0	0
Hemlock/Spruce	A	560	1,285	861	2,706
	B	5,525	785	5,770	12,080
	C	400	340	419	1,159
	D	0	0	0	0
Spruce	A	1,041	3,742	2,262	7,045
	B	2,360	1,446	3,819	7,625
	C	1,039	7,713	15,383	24,135
	D	0	1,683	1,381	3,064
Total Productive Conifer		24,163	18,316	32,570	75,049
Total Cedar		0	0	0	0
Total Hemlock		13,238	1,322	2,675	17,235
Total Hemlock/Spruce		6,485	2,410	7,050	15,945
Total Spruce		4,440	14,584	22,845	41,869
Total Strata A		13,418	6,249	5,539	25,206
Total Strata B		9,286	2,331	9,788	21,405
Total Strata C		1,459	8,053	15,862	25,374
Total Strata D		0	1,683	1,381	3,064
% Cedar		0.0	0.0	0.0	0.0
% Hemlock		54.8	7.2	8.2	23.0
% Hemlock/Spruce		26.8	13.2	21.6	21.2
% Spruce		18.4	79.6	70.1	55.8
% Strata A		55.5	34.1	17.0	33.6
% Strata B		38.4	12.7	30.1	28.5
% Strata C		6.0	44.0	48.7	33.8
% Strata D		0.0	9.2	4.2	4.1

Source: Revision database, December 19, 1989.

Roaded and Roadless

Table 3-179 summarizes the amount of each geozone which is currently in a roadless or roaded condition. Geozone S05 has the highest percentage of area in a roaded condition, and Geozone K06 has the highest number of roaded acres. For the Forest as a whole, 6.6 percent is currently classified as roaded, and 93.4 percent is currently classified as roadless. The "Roadless Areas" section of the AMS describes the criteria and methodology used in identifying roadless and roaded areas.

Table 3-180 displays the miles of road within each geozone. There are 2,963.7 miles of road on the Forest. About 33 percent of these road miles are in locations only accessible by boat and plane. About 32 percent of the miles are currently closed. Some of these closures have been done to protect wildlife habitat values.

These tables are presented here to assist in the following discussions on the habitat capability for the management indicator species.

TABLE 3-179

ACRES OF EACH GEOZONE CLASSIFIED AS ROADLESS OR ROADED.

Geozone	Roadless Acres	Roaded Acres	% Roaded	Geozone	Roadless Acres	Roaded Acres	% Roaded	Geozone	Roadless Acres	Roaded Acres	% Roaded
C01	173,406	486	00	K01	128,560	1,440	01	S01	217,963	78,340	26
C02	314,113	37,240	11	K02	46,555	0	00	S02	122,122	0	00
C03	64,878	0	00	K04	412,531	59,367	13	S03	228,840	80,569	26
C04	32,763	7,403	18	K05	189,422	0	00	S04	49,792	65,046	57
C05	111,039	4,343	04	K06	434,538	253,085	37	S05	46,513	66,688	59
C06	319,748	41,578	12	K07	278,199	0	00	S06	213,630	17,566	08
C07	12,176	0	00	K08	315,515	56,871	15	S07	92,320	25,647	22
C09	270,470	21,885	07	K09	134,663	2,968	02	S08	584,494	21,202	04
C10	381,380	42,663	10	K10	102,001	38	00	S09	736,565	18,069	02
C11	121,719	0	00	K11	106,752	115,544	52	S10	264,224	18,627	07
C12	204,664	0	00	K12	107,740	0	00	S11	66,373	0	00
C13	313,229	0	00	K13	2,251,733	0	00	S12	445,560	2,399	01
C14	646,628	0	00	K14	86,662	0	00	S13	47,519	140	00
C15	938,237	10,970	01	K15	34,477	0	00	S14	26,601	16,862	39
C16	97,281	40	00								
C17	347,993	0	00								
C18	200,961	7,046	03								
C20	84,714	362	00								
C21	175,759	1,250	01								
C22	714,568	2,885	00								
C23	1,945,955	4,439	00								
C24	152,858	6,025	04								
C25	238,860	420	00								
TOTAL	7,863,399	189,035	02	TOTAL	4,629,348	489,313	10	TOTAL	3,142,516	411,155	12

Source: Revision database November 21, 1989.

TABLE 3-180

TONGASS ROADS IN EACH GEOZONE. 1/

Geozone	Arterial Miles	Collector Miles	Local Miles	F/S Hwy Miles	Total Miles	Local Closed Miles	Collector Closed Miles	Access Comments
C02	39.9	44.7	52.7	0.0	137.3	14.3	0.0	HOONAH AND FERRY SYSTEM
C04	7.3	10.0	4.8	0.0	22.1	4.8	10.0	BOAT AND PLANE
C06	31.0	61.0	41.0	0.0	133.0	41.0	54.8	BOAT AND PLANE
C09	0.0	49.0	5.8	0.0	54.8	5.8	33.7	BOAT AND PLANE
C10	0.0	63.3	20.8	0.0	84.1	20.8	39.8	BOAT AND PLANE
C18	0.0	18.4	14.1	0.0	32.5	6.8	0.0	BOAT AND PLANE
C21	0.0	0.0	1.2	0.0	1.2	0.0	0.0	JUNEAU AND FERRY SYSTEM
C22	0.0	0.0	16.2	0.7	16.9	0.0	0.0	BOAT, PLANE AND FISH CAMPS
C24	0.0	22.7	7.7	21.2	51.6	7.7	0.0	YAKUTAT
C25	0.0	0.0	0.9	0.0	0.9	0.0	0.0	BOAT AND PLANE
S01	30.6	29.2	96.7	0.0	156.5	78.3	0.0	BOAT AND PLANE
S03	0.8	63.5	59.0	2.0	125.3	59.0	0.0	KAKE (82.6 mi.) AND BOAT
S04	0.0	50.5	64.4	8.4	123.3	18.1	0.0	PETERSBURG AND FERRY SYSTEM
S05	0.0	54.8	49.8	0.0	104.6	39.8	0.0	BOAT AND PLANE
S06	0.0	6.3	28.3	0.0	34.6	14.8	0.0	BOAT AND PLANE
S07	0.0	44.0	22.6	0.0	66.6	0.0	0.0	WRANGELL AND FERRY SYSTEM
S08	0.0	5.8	15.6	0.0	21.4	13.8	0.0	BOAT AND PLANE
S14	0.0	0.0	13.4	0.0	13.4	13.4	0.0	BOAT AND PLANE
K01	11.3	3.6	9.7	0.0	24.6	9.7	2.3	HYDER, MAINLAND AND FERRY SYSTEM
K04	30.5	38.3	172.8	40.9	282.5	102.1	0.0	KETCHIKAN (47 mi.) AND BOAT
K06	164.2	192.6	501.9	18.1	876.8	221.2	0.0	PRINCE OF WALES AND FERRY SYSTEM
K07	0.0	0.0	3.0	0.0	3.0	0.8	0.0	PRINCE OF WALES AND FERRY SYSTEM
K08	19.0	28.1	75.0	49.3	171.4	52.6	0.0	PRINCE OF WALES AND FERRY SYSTEM
K09	0.0	3.2	3.5	0.0	6.7	1.6	0.0	BOAT AND PLANE
K11	38.6	99.1	269.4	0.0	407.1	88.9	0.0	CAPE POLE AND EDNA BAY
K13	10.4	0.0	1.1	0.0	11.5	NA	NA	WILDERNESS-MINE ACCESS ONLY
TOTAL	383.6	888.1	1,551.4	140.6	2,963.7	815.3	140.6	

TOTAL ACCESSIBLE BY TOWNS OR FERRY SYSTEM	1,992.5
TOTAL NOT ACCESSIBLE BY TOWNS OR FERRY SYSTEM	971.2

Source: Rob Aiken, Transportation Planner, Stikine Area.

1/ Road types (arterial, collector, local, F/S) are defined in the transportation section of the AMS. Non-permanent roads and roads which are no longer needed and are not being maintained are not included in this table.

CURRENT HABITAT CAPABILITY FOR THE MIS

The following discussions and tables display the current habitat capability for the wildlife management indicator species (MIS) in each FORPLAN geozone. This habitat capability is calculated from applying the MIS habitat suitability and capability relationships described previously to the existing vegetative conditions on the Forest.

Several judgement calls had to be made when running the models on the Forest-wide GIS database. These are listed as follows:

1. Subalpine forest was defined as conifer stands above 1,500 feet elevation.

2. Several of the models identified habitat capability values for subalpine old growth, but did not identify habitat capability values for subalpine successional stages. It was assumed that habitat capability values for young successional stages for subalpine forest were the same as for young successional stages of the lower elevation upland forests.

3. Only two stream classes are present in the Forest-wide data base: Class I and Class II. For the models which assign values for riparian areas, the highest model value was always used for the Class I streams and the lowest model value for the Class II streams. No intermediate model values were used. Class I streams include all of the anadromous and high value resident fish habitat, and, therefore, represent the types of streams with highest wildlife use. The Class II streams include those with low value resident fish habitat or no fish habitat, and, therefore, represent the types of streams with the lowest wildlife use.

4. Values for conifer successional stages in the estuary fringe were not identified in some of the models. To assign values for successional stages in the estuary fringe, we used the same percent change as found for successional stages for Class I riparian areas.

5. All "size class 3" stands in the data base were given model values for stands less than 150 years old as identified in the models, except for brown bear and black bear. For brown and black bear models, the size class 3 stands were given values for 150-200 year old second growth. This was done to better represent the timber stand characteristics and bear use for the Yakutat area.

6. All "size class 4" stands in the data base were given the model values for old-growth stands. To our understanding, this represents old growth conditions accurately on the Forest except for the Yakutat area (see Old-Growth Forests Section of the AMS). In the Yakutat area, size class 4 stands are younger than the remainder of the Forest and do not fully fit current working old growth definitions. Assigning old growth values to the size class 4 stands at Yakutat seemed to better represent wildlife use in that area than using younger stand values.

7. The following Wilderness areas either do not have any riparian areas identified for them, or have incomplete riparian area information: West Chichagof-Yakobi, Admiralty, South Baranof, Russell Fiord, Endicott River, Tracy Arm-Fords Terror, Misty Fiords, South Prince of Wales, Coronation, Warren Island, and Maurelle Islands. For these Wilderness areas, the MIS model programs used values for upland habitats. This will have the following effect on the habitat capability estimates for these species: habitat capability will be underestimated for brown bear, black bear, river otter, bald eagle, and marten; habitat capability will be overestimated for deer.

8. The following Wilderness areas either do not have any soils information in the Forest-wide GIS database, or the information is incomplete: West Chichagof-Yakobi, Admiralty, South Baranof, Russell Fiord, Endicott River, Tracy Arm-Fords Terror, Misty Fiords, South Prince of Wales, Coronation, Warren Island, and Maurelle, Islands. Identification of estuary areas and plant associations required soils information. The results of not having this information for these Wilderness areas will effect the habitat capability estimates for these species: habitat capability will be underestimated for brown bear and black bear. No habitat capability estimates for Wilderness areas which do not have soils/plant association data.

9. The estimates of habitat capability are presented by roaded and roadless areas for each Forplan geozone. The roadless and roaded area delineations are discussed in the Roadless Areas Section and Appendix C of the AMS.

10. The habitat capability estimates for the wildlife MIS are presented for both 1954 vegetative conditions and beginning 1989 vegetative conditions. The 1989 vegetative conditions are those conditions which were digitized directly into the GIS database. The 1954 vegetative conditions were created by recreating old-growth forest conditions in the GIS database for all land currently non-stocked due to logging, and all size class 1, 2, and 3 lands in roaded areas of the Forest. The roaded areas were used to identify which areas of the Forest had been logged. In recreating the old-growth forest conditions, the following steps were taken: 1) The logged areas were given attributes for high volume strata classes C and D (previously termed volume classes 6 and 7). 2) If regenerating logged areas had tree species identified within them, then it received the old growth attribute for that species. If no tree species was identified, then a spruce/hemlock attribute was given. Much of the regeneration in logged areas is identified as spruce; spruce easily regenerates on sites after logging. Therefore, this approach may have biased the 1954 estimate of old growth more heavily to spruce than would have occurred there naturally.

11. The habitat capability model for Sitka black-tailed deer (Suring et al. 1988) recommended identifying north aspects as occurring between 291 degrees to 66 degrees on a compass, and south aspects as occurring between 67 degrees to 290 degrees on a compass. These aspect breaks were not available in the Forest-wide GIS database. We used 316 degrees to 45 degrees for north aspects, and 46 degrees to 315 degrees for south aspects, when estimating habitat capability for deer.

12. The habitat capability model for deer also recommended different habitat capability values for thinned and unthinned stands on regenerating clearcuts: thinned clearcuts received a higher value. Thinned and unthinned attributes for regenerating clearcuts were not available in the GIS database; therefore, the lower unthinned habitat capability value was used for all regenerating clearcuts.

13. The Vancouver Canada goose habitat capability model (Doyle 1988) recommended applying the model to all areas of land within 1/2 mile along each side of all uncontained river and stream channels, and within 1/2 mile of all lakes. This recommendation was attempted, however the 1/2 mile buffers overlapped each other in numerous areas, and the computer stopped the buffering process when this occurred. An alternative approach which was used was to apply the model to all of the lands below 800 feet elevation. This was done with the rationale that

most of the nesting and brood rearing probably occurred at the lower elevations; and since the model used plant associations, the more suitable plant associations would occur in proximity to the riparian areas and lakes.

Sitka Black-tailed Deer

Table 3-181 displays the winter habitat capability for Sitka black-tailed deer. The total winter habitat capability for deer in 1954 is estimated to have been 322,998 animals, and in 1989 is estimated to be 296,749 animals. This is an 8 percent change between 1954 and 1989. Existing roadless areas provide 83 percent of the 1989 habitat capability, and roaded areas provide 17 percent.

The numbers in Table 3.xx do not include an evaluation of the effects of patch size. With the Forest-wide GIS database, it was not possible to identify patch sizes and apply the estimated effects of smaller patch sizes. As previously discussed, the patch size relationship is poorly understood and not well developed for Southeast Alaska. However, to gain an understanding of what the possible effects of small patch sizes may be, the following potential maximum effect analysis is offered:

Timber management activities which would reduce natural patch sizes would be associated with the roaded areas within areas occupied by wolves. Habitat capability for the roaded areas with wolves without the effect of patch size is 41,669 deer. If all of the deer habitat capability was coming from the remaining old-growth in the roaded areas, and all of the old-growth patch sizes were less than 100 acres, the habitat capability would only be 30 percent of 41,669, or 12,501 deer. Using this potential maximum effect analysis, the total deer winter habitat capability for the Forest would be 267,581. This would be a maximum 17 percent change between 1954 and 1989.

TABLE 3-181

SITKA BLACK-TAILED DEER WINTER HABITAT CAPABILITY (NUMBER OF ANIMALS) WITHIN ROADLESS AND ROADED AREAS IN EACH GEOZONE.

Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989
C01	2,628	16	16	K01	0	0	0	S01	9,775	5,293	3,504
C02	8,022	2548	1,609	K02	2,887	0	0	S02	10,533	113	-
C03	2,051	0	0	K04	11,019	3,338	1,772	S03	3,855	3,005	2,052
C04	783	714	419	K05	6,142	0	0	S04	1,043	2,857	1,909
C05	1,604	178	65	K06	14,554	19,784	13,024	S05	891	2,913	1,946
C06	6,385	3598	1,854	K07	13,774	0	0	S06	7,905	900	656
C07	363	0	0	K08	13,717	3,080	1,719	S07	1,857	1,104	825
C09	3,074	1903	790	K09	10,463	-	388	S08	3,523	931	468
C10	10,390	3947	2,242	K10	8,254	6	6	S09	3,060	235	200
C11	1,789	0	0	K11	6,163	14,713	11,175	S10	8,310	1,362	875
C12	5,475	0	0	K12	788	0	0	S11	3,678	62	0
C13	2,424	0	0	K13	11,676	14	0	S12	2,032	-	90
C14	0	0	0	K14	5,023	0	0	S13	423	-	2
C15	30,172	1189	550	K15	3,333	0	0	S14	1,259	1,585	990
C16	0	0	0								
C17	0	0	0								
C18	341	19	14								
C20	3,005	23	23								
C21	1,702	46	44								
C22	0	0	0								
C23	516	0	0								
C24	0	0	0								
C25	851	10	10								
TOTAL	81,575	14,191	7,636	TOTAL	107,793	40,935	28,084	TOTAL	58,144	20,360	13,517

Source: Revision Database December 14, 1989.

Dash (-) indicates incomplete data due to GIS programming and/or data errors in roaded areas.

River Otter Table 3-182 displays the spring/early summer habitat capability for river otters. The total habitat capability in 1954 is estimated to have been 7,221 animals, and in 1989 is estimated to be 6,730 animals. This is a seven percent change between 1954 and 1989. These estimates do not include the wilderness areas where riparian areas are not identified. About 85 percent of the 1989 habitat capability is from roadless areas, and roaded areas provide 15 percent. Riparian buffers which have been maintained along rivers and streams in areas which have been roaded and logged are not "picked up" very well in the Forest-wide GIS database. These riparian buffers help maintain habitat capability for otters, and when they are not picked up in the GIS database, the result is an underestimate of habitat capability, and an overestimate of effects due to logging activity.

TABLE 3-182

RIVER OTTER SPRING/EARLY SUMMER HABITAT CAPABILITY (NUMBER OF ANIMALS) FOR ROADLESS AND ROADED AREAS IN EACH GEOZONE.

Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	1989
C01	118	1	1	K01	21	4	3	S01	237	107	80
C02	177	81	48	K02	50	0	0	S02	183	3	-
C03	36	0	0	K04	182	94	56	S03	117	56	52
C04	11	20	12	K05	128	0	0	S04	21	41	36
C05	85	24	12	K06	188	272	190	S05	17	50	39
C06	180	106	52	K07	243	0	0	S06	170	21	16
C07	14	0	0	K08	180	45	29	S07	33	15	15
C09	114	70	29	K09	144	-	10	S08	105	36	27
C10	217	91	40	K10	116	0	0	S09	142	26	17
C11	84	0	0	K11	85	167	138	S10	158	57	29
C12	51	0	0	K12	52	0	0	S11	127	2	0
C13	142	0	0	K13	442	0	0	S12	76	-	7
C14	32	0	0	K14	94	0	0	S13	27	-	1
C15	307	10	5	K15	48	0	0	S14	55	38	27
C16	2	0	0								
C17	16	0	0								
C18	66	17	8								
C20	55	1	1								
C21	68	2	2								
C22	64	7	1								
C23	250	15	8								
C24	66	4	1								
C25	139	3	3								
TOTAL	2,294	452	223	TOTAL	1,973	582	426	TOTAL	1,468	452	346

Source: Revision Database December 17, 1989.

Dash (-) indicates incomplete data due to GIS programming and/or data errors in roaded areas.

Marten

Table 3-183 displays the marten winter habitat capability for each geozone. The total winter habitat capability in 1954 is estimated to have been 25,111 animals, and in 1989 is estimated to be 23,778 animals. This is a five percent change from 1954 to 1989. About 88 percent of the 1989 habitat capability is from roadless areas, and 12 percent from roaded areas.

As previously discussed, patch size does affect the habitat capability of timber stands. With the Forest-wide GIS database, it was not possible to identify old-growth stand sizes and apply the effects of patch size. However, timber management activities which would reduce natural patch sizes would only be associated with the roaded areas. If the remaining old-growth stand sizes in the roaded areas averaged 80-100 acres, the existing habitat capability would be about 60 percent of 2,765, or 1,659 marten. This would then make the total Forest-wide habitat capability 22,672 marten, which would be a 10 percent change between 1954 and 1989.

As previously discussed, additional effects of road access on marten populations will not be calculated at this time (1989). The effects need further validation, and there is open discussion regarding whether the effects are due to habitat capability or due to inadequate trapping regulations resulting in overharvest when habitat capability does exist.

TABLE 3-183

MARTEN WINTER HABITAT CAPABILITY (NUMBER OF ANIMALS) FOR ROADLESS AND ROADED AREAS IN EACH GEOZONE.

Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989
C01	238	2	2	K01	53	5	4	S01	706	348	258
C02	610	154	109	K02	96	0	0	S02	384	4	-
C03	115	0	0	K04	867	272	172	S03	450	262	210
C04	62	36	24	K05	476	0	0	S04	97	211	164
C05	219	19	11	K06	1,064	1088	728	S05	0	0	0
C06	587	187	113	K07	699	0	0	S06	453	64	52
C07	0	0	0	K08	684	179	106	S07	176	83	69
C09	343	106	55	K09	399	-	11	S08	397	73	48
C10	616	174	92	K10	279	0	0	S09	597	57	48
C11	169	0	0	K11	293	565	358	S10	669	72	46
C12	296	0	0	K12	182	0	0	S11	254	0	0
C13	394	0	0	K13	2,547	0	0	S12	303	-	6
C14	132	0	0	K14	211	0	0	S13	109	0	0
C15	2,170	54	28	K15	108	0	0	S14	0	0	0
C16	60	0	0								
C17	148	0	0								
C18	249	28	20								
C20	210	2	2								
C21	202	2	2								
C22	177	6	1								
C23	710	20	10								
C24	233	23	14								
C25	520	2	2								
Total	8,460	815	485	Total	7,958	2109	1,379	Total	4,595	1174	901

Source: Revision Database December 17, 1989

Dash (-) indicates incomplete data due to GIS programming and/or data errors in roaded areas.

Brown Bear

Table 3-184 displays the brown bear late summer habitat capability for roaded and roadless areas within each geozone. The total habitat capability in 1954 is estimated to have been 10,089 animals, and in 1989 is estimated to be 9,960 animals. This is a one percent change from 1954 to 1989. Existing roadless areas provide 97 percent of the habitat capability, and roaded areas provide 3 percent.

The habitat capability displayed in Table 3-184 does not include the effects of human disturbance and human caused mortality as identified by Schoen et al.(1989). At the present time, the Forest-wide GIS database does not contain most of the human activities or developments (such as cabins, roads, floatplane lakes, open-pit garbage dumps) needed to develop the zones of influence. However, many of the zones of influence associated with roads end up overlapping one another. For example, creating zones of influence around all of the arterial, collector, and local roads, all of the communities, open-pit garbage dumps, and campsites associated with roads have also been included. The roaded areas identified in Table 3-184 would include most of the zones of influence described by Schoen et al. (1989). Table 3-184 calculates the brown bear habitat capability within roaded areas. Using a potential maximum effects scenario of an 80 percent reduction in habitat capability in these roaded areas (only communities larger than 500 people would have a greater reduction), the brown bear habitat capability in the roaded areas would decline from 285 bears to 57 bears, and the Forest-wide habitat capability would be 9,732 bears instead of 9,960. This would be a four percent change between 1954 and 1989. This is a potential maximum effects evaluation, and the current efforts by State and Federal agencies to reduce human/bear encounters, and the current mortality records do not indicate that this worst case situation is actually occurring.

All zones of influence and associated reductions in habitat capability should be calculated with site-specific knowledge and information. For example, the recommended reduction in habitat capability for Forest Service cabins (Schoen 1989) may be too severe when compared with the lack of evidence that human bear encounters are occurring. For example, there are 12 Forest Service cabins in the Admiralty Wilderness. Since 1973, only two bear incidents involving one bear have been associated with recreation use of the cabins (Ken Mitchell, personal communication). If the model recommendations were used, a 1-mile zone of influence would be placed around all of the cabins, and the bear habitat capability in that zone of influence would be reduced by 20 percent. The information presented does not seem to justify the 20 percent reduction.

TABLE 3-184

BROWN BEAR LATE SUMMER HABITAT CAPABILITY (NUMBER OF ANIMALS) WITHIN ROADLESS AND ROADED AREAS WITHIN EACH GEOZONE.

Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989
C01	179	1	1	K01	87	2	2	S01	0	0	0
C02	406	66	50	K02	0	0	0	S02	0	0	0
C03	72	0	0	K04	0	0	0	S03	0	0	0
C04	42	13	9	K05	275	0	0	S04	0	1	0
C05	142	12	8	K06	0	0	0	S05	0	0	0
C06	417	76	50	K07	0	0	0	S06	0	0	0
C07	18	0	0	K08	0	0	0	S07	80	22	21
C09	289	41	23	K09	0	0	0	S08	145	29	20
C10	438	72	44	K10	0	0	0	S09	654	27	23
C11	135	0	0	K11	0	0	0	S10	0	0	0
C12	212	0	0	K12	129	0	0	S11	0	0	0
C13	297	0	0	K13	2,073	0	0	S12	250	3	3
C14	121	0	0	K14	0	0	0	S13	0	0	0
C15	1,256	15	8	K15	0	0	0	S14	0	0	0
C16	72	0	0								
C17	132	0	0								
C18	198	13	10								
C20	118	1	1								
C21	160	1	1								
C22	143	3	1								
C23	971	9	5								
C24	145	7	5								
C25	19	0	0								
Total	5,982	330	216	Total	2,564	2	2	Total	1,129	82	67

Source: Revision Database December 17, 1989.

Black Bear

Table 3-185 displays the black bear habitat capability for roaded and roadless areas within each geozone. The total habitat capability in 1954 is estimated to have been 14,266 animals, and in 1989 is estimated to be 14,261 animals. This is essentially no change between 1954 and 1989. Existing roadless areas provide [illegible] percent of the habitat capability, and roaded areas provide 11 percent.

The habitat capability displayed in Table 3-185does not include the effects of human disturbance and human caused mortality as identified by Suring, et al.(1989). At the present time, the Forest-wide GIS database does not contain most of the human activities or developments (such as cabins, roads, floatplane lakes, open-pit garbage dump) needed to develop the zones of influence. However, most of the zones of influence associated with roads end up overlapping one another. For example, by creating zones of influence around all of the arterial, collector, and local roads, all of the communities, open-pit garbage dumps, and camp sites associated with roads have also been included. The roaded areas identified in Table 3-185would include most of the zones of influence described by Suring et al. (1989). Table 3-185 calculates the black bear habitat capability within the roaded areas. Using a potential maximum effects scenario of a 40 percent reduction in habitat capability in these roaded areas (only open-pit garbage dumps would have a greater reduction), the black bear habitat capability in the roaded areas would decline from 1,634 bears to 980 bears, and the Forest-wide habitat capability would be 13,616 bears instead of 14,261. This would be a five percent change between 1954 and 1989. This is a maximum effects evaluation, and the current efforts by State and Federal agencies to reduce human/bear encounters, and the current mortality records do not indicate that this maximum effects situation is actually occurring.

All zones of influence and associated reductions in habitat capability should be calculated with site-specific knowledge and information. Some areas may be susceptible to many human/bear encounters, while other areas may have none.

TABLE 3-185

BLACK BEAR HABITAT CAPABILITY (NUMBERS OF ANIMALS) WITHIN ROADLESS AND ROADED AREAS WITHIN EACH GEOZONE.

Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989
C01	0	0	0	K01	87	2	2	S01	390	157	147
C02	0	0	0	K02	0	0	0	S02	219	2	-
C03	0	0	0	K04	691	115	109	S03	359	137	138
C04	0	0	0	K05	330	0	0	S04	86	121	118
C05	0	0	0	K06	732	441	460	S05	78	120	117
C06	0	0	0	K07	457	85	0	S06	352	32	30
C07	0	0	0	K08	515	-	87	S07	165	47	46
C09	0	0	0	K09	231	-	6	S08	357	33	33
C10	0	0	0	K10	180	0	0	S09	676	29	30
C11	0	0	0	K11	186	207	213	S10	437	34	32
C12	0	0	0	K12	168	0	0	S11	124	1	0
C13	0	0	0	K13	2,800	0	0	S12	282	3	3
C14	157	0	0	K14	139	0	0	S13	83	0	0
C15	0	0	0	K15	60	0	0	S14	32	34	30
C16	83	0	0								
C17	128	0	0								
C18	212	14	13								
C20	0	0	0								
C21	224	2	2								
C22	111	3	2								
C23	979	9	8								
C24	136	10	7								
C25	390	1	1								
Total	2,420	39	33	Total	6,567	850	877	Total	3,640	750	724

Source: Revision Database December 17, 1989.

Dash (-) indicates incomplete data due to GIS programming and/or data errors in roaded areas.

Gray Wolf

Table 3-186 displays the gray wolf habitat capability evaluations for 1954 and 1989. The estimated wolf habitat capability in 1954 is estimated to have been 957 animals, and in 1989 is estimated to be 867 animals. This is a 9 percent change between 1954 and 1989.

Research in Southeast Alaska indicates wolf populations can exist in low numbers in the absence of large ungulate prey species, with densities of about .01 wolf per square mile (Suring et al. 1988). This density is used as a minimum habitat capability for wolves on the Forest, and is calculated to be 157 animals for both 1954 and 1989.

Sitka black-tailed deer are the most abundant and widespread ungulate prey species for wolves. The 1989 habitat capability provided by deer is calculated to be 695 wolves, or 80 percent of the total wolf habitat capability.

Moose are not as abundant or widespread as deer on the Forest. The habitat capability provided by moose is calculated to be 14 wolves, or 2 percent of the 1989 total wolf habitat capability.

Table 3-186 does not contain evaluations on wolf habitat capability provided by mountain goats. This is because mountain goat calculations have not been completed for the Forest at this time (1989). However, preliminary evaluations indicate the following: ADF&G estimates the current mountain goat population to be about 4,000 animals. Using values provided by Suring et al. (1988), the wolf habitat capability from 4,000 mountain goats would only be 5 wolves.

TABLE 3-186

ESTIMATED GRAY WOLF HABITAT CAPABILITY WITHIN GEOZONES WIHTIN OCCUPIED RANGE OF WOLVES.

Geozone	Total Acres	Acres of Rock and Ice	Sq. Mi. of Habitat 1/	Minimum Wolf Pop. 2/	Winter Deer Populations 1954	Winter Deer Populations 1989	Wolf Pop. from Deer 1954	Wolf Pop. from Deer 1989	Winter Moose Pop.	Wolf Pop. from Moose 1954&89 3/	Total Wolf Population 1954	Total Wolf Population 1989
C14	650,103	453,884	306.59	3	0	0	0	0	0	0	3	3
C16	98,070	31,835	103.49	1	0	0	0	0	50	0	1	1
C17	349,134	120,051	357.94	4	0	0	0	0	0	0	4	4
C18	214,530	35,800	279.27	3	472	462	1	1	100	1	5	5
C21	182,721	37,024	227.65	2	1,748	1,746	5	5	0	0	7	7
C22	719,339	216,766	785.27	8	0	0	0	0	435	3	11	11
C23	1,971,122	1,042,179	1451.47	15	655	655	2	2	240	2	19	19
C24	159,485	0	249.20	2	0	0	0	0	400	3	5	5
C25	240,716	0	376.12	4	1,121	1,118	3	3	0	0	7	7
K01	130,025	64,032	103.11	1	0	0	0	0	0	0	1	1
K02	46,785	0	73.10	1	3,176	3,176	9	9	0	0	10	10
K04	487,961	0	762.44	8	17,256	14,971	50	43	0	0	58	51
K05	193,473	0	302.30	3	7,210	7,210	21	21	0	0	24	24
K06	699,958	0	1093.68	11	42,275	32,198	123	93	0	0	134	104
K07	279,242	0	436.32	4	15,642	15,642	45	45	0	0	49	49
K08	381,786	0	596.54	6	19,385	17,455	56	51	0	0	62	57
K09	141,794	0	221.55	2	11,936	11,936	35	35	0	0	37	37
K10	102,921	0	160.81	2	9,086	9,086	26	26	0	0	28	28
K11	224,209	0	350.33	4	24,283	19,226	70	56	0	0	74	59
K12	107,882	0	168.57	2	1,024	1,024	3	3	0	0	5	5
K13	2,280,758	417,030	2912.08	29	14,081	14,081	41	41	35	0	70	70
K14	87,567	0	136.82	1	5,631	5,631	16	16	0	0	17	17
S01	302,218	0	472.22	5	18,568	15,732	54	46	0	0	59	51
S02	124,065	0	193.85	2	11,587	11,587	34	34	0	0	36	36
S03	316,543	0	494.60	5	8,730	7,139	25	21	0	0	30	26
S04	115,283	0	180.13	2	5,063	3,543	15	10	0	0	17	12
S05	117,584	0	183.73	2	4,953	3,404	14	10	0	0	16	12
S06	235,054	0	367.27	4	10,227	9,804	30	28	0	0	34	32
S07	119,543	0	186.79	2	3,719	3,219	11	9	0	0	13	11
S08	611,468	369,699	377.76	4	5,484	4,818	16	14	200	1	21	19
S09	764,566	248,868	805.78	8	4,151	4,048	12	12	0	0	20	20
S10	287,266	0	448.85	4	11,498	10,801	33	31	0	0	37	35
S11	67,540	0	105.53	1	4,385	4,311	13	13	0	0	14	14
S12	448,703	243,543	320.56	3	2,595	2,595	8	8	450	3	14	14
S13	47,815	0	74.71	1	552	552	2	2	0	0	3	3

TABLE 3-186 CONTINUED

ESTIMATED GRAY WOLF HABITAT CAPABILITY WITHIN GEOZONES WIHTIN OCCUPIED RANGE OF WOLVES.

Geozone	Total Acres	Acres of Rock and Ice	Sq. Mi. of Habitat 1/	Minimum Wolf Pop.2/	Winter Deer Populations 1954	Winter Deer Populations 1989	Wolf Pop. from Deer 1954	Wolf Pop. from Deer 1989	Winter Moose Pop.	Wolf Pop. from Moose 1954&89 3/	Total Wolf Population 1954	Total Wolf Population 1989
S14	44,043	0	68.82	1	3,421	2,581	10	7	0	0	11	8
TOTAL	13,351,272	3,280,711	15,735	160	269,914	239,751	783	695	1,910	14	957	867

Sources: Winter deer population - Revision Database November 21, 1989; Winter Moose Population - Strategic Plan for Management of Moose in Region I, Southeast Alaska, 1990-1994, Public Review Draft, ADF&G, July 1989.

1/ Square miles of habitat is the total acres minus the acres of rock and ice divided by 640; we subtracted out the acres of rock and ice because they do not provide habitat for wolves.

2/ Calculated by multiplying the square miles of habitat by .01 wolves per square mile. Studies in Southeast Alaska indicated that wolves could sustain this population density without ungulates (deer, moose, mountain goats)(refer to text for more explanation).

3/ Estimates of moose numbers in 1954 are not available; moose populations may be higher today than in 1954; however, the same moose population numbers are used for both 1954 and 1989.

Red Squirrel

Table 3-187 displays the red squirrel habitat capability, which is estimated to be 6,165,893 animals in 1954, and 6,000,724 animals in 1989. This is a three percent change between 1954 and 1989.

Red squirrels have been identified as a species which show a habitat use relationship with the size of its preferred habitats. Optimum use occurs when patches of preferred habitat are greater than 30 acres in size, and use declines with decreasing patch size and approaches zero when patches are less than 3 acres. The habitat capability displayed in Table 3-187 does not take into account the effects of patch size. Evaluating patch sizes is not possible with the Forest-wide GIS database. However, timber harvesting practices which would reduce the natural sizes of old-growth patches would occur only within the roaded areas of the Forest. It is not expected that a large amount of the patch sizes in the roaded areas of the Forest would be less than the 30 acre optimum size; therefore, any reductions in habitat capability due to small patch sizes are expected to be very small.

TABLE 3-187

RED SQUIRREL HABITAT CAPABILITY (NUMBER OF ANIMALS) WITHIN ROADLESS AND ROADED AREAS IN EACH GEOZONE.

Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989
C01	84,210	356	356	K01	21,944	1,064	948	S01	168,740	76,146	58,704
C02	213,040	36,611	26,707	K02	28,810	0	0	S02	94,870	906	870
C03	36,730	0	0	K04	246,810	57,461	38,305	S03	135,490	61,774	49,482
C04	23,010	7,664	5,189	K05	126,260	0	0	S04	29,040	51,400	40,542
C05	73,495	4,501	2,892	K06	0	0	0	S05	29,750	53,539	42,385
C06	222,160	43,363	27,929	K07	0	0	0	S06	136,600	14,804	12,550
C07	8,020	0	0	K08	0	0	0	S07	60,010	20,601	17,025
C09	130,820	23,768	13,073	K09	0	0	0	S08	128,900	15,584	9,689
C10	223,620	40,786	24,029	K10	0	0	0	S09	187,445	12,902	9,180
C11	52,800	0	0	K11	0	0	0	S10	184,870	17,192	11,840
C12	101,380	0	0	K12	55,376	0	0	S11	52,200	705	375
C13	124,244	0	0	K13	870,650	0	0	S12	93,910	0	0
C14	46,540	0	0	K14	0	0	0	S13	30,740	32	32
C15	624,124	10,847	8,343	K15	0	0	0	S14	20,520	18,270	11,782
C16	32,130	48	48								
C17	25,870	0	0								
C18	73,130	5,764	4,307								
C20	56,600	317	317								
C21	89,960	822	833								
C22	127,010	2,071	546								
C23	276,935	4,468	2,344								
C24	62,600	8,143	6,165								
C25	162,070	504	504								
Total	2,870,498	190,080	123,582	Total	1,349,850	58,525	39,253	Total	1,353,085	343,855	264,456

Source: Revision Database, December 17, 1989.

Bald Eagle

Table 3-188 displays the bald eagle nesting habitat capability. The estimated nesting habitat capability in 1954 is 19,750 adult bald eagles, and in 1989 is estimated to be 17,927 adult bald eagles. This is a nine percent change between 1954 and 1989. Bald eagle nest sites which have been maintained with protected buffers, and riparian buffers which have been maintained along rivers and streams in areas which have been roaded and logged are not "picked up" very well in the Forest-wide GIS database. These buffers help maintain habitat capability for eagles, and when they are not picked up in the GIS database, the result is an underestimate of habitat capability, and an overestimate of effects due to logging activity. The estimated nine percent change in nesting habitat capability may be high.

Nesting habitat has not been determined to be currently limiting bald eagle populations. The U.S. Fish and Wildlife Service conducts surveys every 5 years to estimate the number of adult bald eagles in Southeast Alaska. The last survey was in 1987, which estimated an adult population of about 12,000 eagles. The nesting habitat capability displayed in Table 3-188 indicates unused nesting habitat capability when compared to the existing bald eagle population estimate. It should also be noted that additional nesting habitat capability exists on non-National Forest lands in Southeast Alaska, and this would further indicate that not all of the available nesting habitat capability is currently being used by the bald eagle population.

There are other factors which indicate that more than just the availability of suitable nest trees affects the abundance and distribution of bald eagles. For one, nest survey data from the U.S. Fish and Wildlife Service illustrate that nest densities along the coast range from a high of 10.4 nests per mile of shoreline to 0 nests per mile of shoreline, and this range is not solely the result of the presence or absence of suitable nest trees.

TABLE 3-188

BALD EAGLE NESTING HABITAT CAPABILITY (NUMBER OF ADULT BIRDS) FOR ROADLESS AND ROADED AREAS WITHIN EACH GEOZONE.

Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989
C01	380	3	3	K01	62	10	7	S01	682	303	208
C02	541	250	132	K02	107	0	0	S02	526	10	0
C03	108	0	0	K04	404	256	125	S03	296	136	121
C04	33	60	32	K05	279	0	0	S04	51	106	86
C05	264	78	35	K06	460	758	446	S05	41	139	97
C06	563	338	147	K07	594	0	0	S06	433	60	38
C07	30	0	0	K08	468	133	76	S07	100	41	43
C09	358	229	79	K09	373	-	31	S08	282	99	61
C10	663	292	108	K10	270	0	2	S09	356	75	42
C11	260	0	0	K11	206	458	338	S10	438	193	82
C12	133	0	0	K12	112	0	0	S11	323	8	0
C13	397	0	0	K13	1,132	0	0	S12	231	-	27
C14	84	0	0	K14	204	0	0	S13	62	-	2
C15	931	26	11	K15	115	0	0	S14	167	126	84
C16	3	0	0								
C17	28	0	0								
C18	177	46	15								
C20	156	4	4								
C21	189	7	7								
C22	120	31	0								
C23	609	42	19								
C24	156	15	1								
C25	449	12	12								
TOTAL	6,632	1,433	605	TOTAL	4,786	1,615	1,025	TOTAL	3,988	1,296	891

Source: Revision Database, December 17, 1989.

A dash (-) indicates incomplete data due to GIS programming and/or data errors in roaded areas.

Red-breasted Sapsucker

Table 3-189 displays the red-breasted sapsucker spring adult breeding habitat capability. The estimated 1954 habitat capability is 985,544 birds, and in 1989 is estimated to be 948,331 birds. This is a four percent change from 1954 to 1989. Roadless areas provide for 90 percent of the habitat capability, and roaded areas provide 10 percent.

As previously discussed, red-breasted sapsuckers are a species which show a habitat/use relationship with the size of their preferred habitats, with optimum use occurring when patches are greater than 250 acres in size. Use declines with decreasing patch size and becomes zero when patches are less than 5 acres. The habitat capability in Table 3.xx does not include the effects of patch size. With the Forest-wide GIS database, it was not possible to identify old-growth stand sizes and apply the effects of patch size. However, timber management activities which would reduce natural old-growth patch sizes would only be associated with the roaded areas. If the remaining old-growth stand sizes in the roaded areas averaged 80-100 acres, the existing habitat capability would be about 60 percent of 94,571, or 56,743 birds. This would then make the total Forest-wide habitat capability 910,503 birds, which would be an eight percent change between 1954 and 1989.

TABLE 3-189

RED-BREASTED SAPSUCKER SPRING HABITAT CAPABILITY (NUMBER OF ADULT BIRDS) IN ROADED AND ROADLESS AREAS IN EACH GEOZONE.

Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989
C01	10,192	50	51	K01	2,354	128	112	S01	23,806	10,613	7,803
C02	25,667	4,892	3,714	K02	2,115	0	0	S02	13,661	145	-----
C03	4,465	0	0	K04	35,404	8,195	5,843	S03	15,188	9,242	7,175
C04	2,989	1,057	745	K05	18,740	0	0	S04	4,227	7,689	6,186
C05	8,552	492	301	K06	38,798	30,818	22,406	S05	3,507	7,746	5,750
C06	26,412	5,406	3,533	K07	23,085	0	0	S06	18,051	2,017	1,588
C07	916	0	0	K08	25,126	5,255	3,475	S07	7,584	2,891	2,407
C09	14,484	2,931	1,602	K09	15,196	151	448	S08	17,486	2,054	1,482
C10	25,929	4,891	2,773	K10	10,990	-	7	S09	30,542	1,999	1,859
C11	6,811	0	0	K11	10,813	14,698	9,830	S10	23,747	2,110	1,398
C12	9,754	0	0	K12	8,128	0	0	S11	8,263	84	-
C13	14,492	0	0	K13	115,279	0	0	S12	12,600	-	195
C14	6,443	0	0	K14	6,863	0	0	S13	4,201	-	15
C15	88,822	1,439	817	K15	4,217	0	0	S14	3,241	2,368	1,497
C16	3,118	8	8								
C17	4,872	0	0								
C18	10,038	910	712								
C20	8,005	44	46								
C21	13,088	116	118								
C22	3,471	130	3								
C23	33,646	588	288								
C24	5,313	543	300								
C25	23,069	84	84								
Total	350,548	23,581	15,095	Total	317,108	59,245	42,121	Total	186,104	48,958	37,355

Source: Revision Database, December 19, 1989.

Dash (-) indicates incomplete data due to GIS programming and/or data errors in roaded areas.

Hairy Woodpecker

Table 3-190 displays the hairy woodpecker winter habitat capability. The estimated 1954 habitat capability is 119,138 birds, and in 1989 is estimated to be 103,263 birds. This is a 13 percent change between 1954 and 1989. Roadless areas provide for 87 percent of the habitat capability, and roaded areas provide 13 percent.

As previously discussed, hairy woodpeckers are a species which show a habitat use relationship with the size of its preferred habitats, with optimum use occurring when patches are greater than 500 acres in size. Use declines with decreasing patch size and becomes zero when patches are less than 10 acres. The habitat capability in Table 3-190 does not include the effects of patch size. With the Forest-wide GIS database, it was not possible to identify old-growth stand sizes and apply the effects of patch size. However, timber management activities which would reduce natural old-growth patch sizes would only be associated with the roaded areas. If the remaining old-growth stand sizes in the roaded areas averaged 80-100 acres, the existing habitat capability would be about 55 percent of 13,454, or 7,400 birds. This would then make the total Forest-wide habitat capability 97,209 birds, which would be an 18 percent change between 1954 and 1989.

TABLE 3-190

HAIRY WOODPECKER WINTER HABITAT CAPABILITY (NUMBER OF BIRDS) WITHIN ROADLESS AND ROADED AREAS IN EACH GEOZONE.

Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	1989
C01	1,003	4	4	K01	273	34	27	S01	3,300	2,420	1,492
C02	2,877	919	436	K02	134	0	0	S02	1,540	21	-
C03	297	0	0	K04	4,138	1,844	796	S03	1,304	1,380	755
C04	303	227	99	K05	1,898	0	0	S04	354	1,290	708
C05	717	117	37	K06	5,235	7,730	3,587	S05	266	1,229	645
C06	2,574	1235	446	K07	3,187	0	0	S06	1,720	318	187
C07	46	0	0	K08	3,213	1,305	438	S07	727	449	276
C09	1,214	707	167	K09	1,794	-	91	S08	1,678	466	170
C10	1,832	1,120	249	K10	1,000	1	1	S09	2,613	357	184
C11	506	0	0	K11	1,547	4,213	1,931	S10	2,071	398	122
C12	651	0	0	K12	811	0	0	S11	1,212	25	-
C13	954	0	0	K13	9,962	0	0	S12	1,422	-	31
C14	488	0	0	K14	633	0	0	S13	418	-	2
C15	11,567	417	162	K15	457	0	0	S14	279	538	189
C16	253	0	0								
C17	474	0	0								
C18	1,120	163	76								
C20	947	5	5								
C21	1,235	17	16								
C22	615	52	0								
C23	2,873	137	33								
C24	1,119	185	86								
C25	2,958	6	6								
Total	36,623	5,311	1,822	Total	34,282	15,127	6,871	Total	18,904	8,891	4,761

Source: Revision Database, December 17, 1989

Dash (1) indicates incomplete data due to GIS programming and/or data errors in roaded areas.

Brown Creeper

Table 3-191 displays the brown creeper winter habitat capability. The estimated 1954 habitat capability is estimated to be 142,003 birds, and in 1989 is estimated to be 92,054 birds. This is a 35 percent change between 1954 and 1989. Roadless areas currently provide for 81 percent of the habitat capability and roaded areas provide 19 percent.

As previously discussed, brown creepers are a species which show a habitat use relationship with the size of its preferred habitats, with optimum use occurring when patches are greater than 15 acres in size. Use declines with decreasing patch size and becomes zero when patches are less than 1 acre. The habitat capability in Table 3-191 does not include the effects of patch size. With the Forest-wide GIS database, it was not possible to identify old-growth stand sizes and apply the effects of patch size. However, timber harvesting practices which would reduce the natural sizes of old-growth patches would occur only within the roaded areas of the Forest. It is not expected that a large amount of the patch sizes in the roaded areas of the Forest would be less than the 15 acre optimum size; therefore, any reductions in habitat capability due to small patch sizes are expected to be very small.

TABLE 3-191

BROWN CREEPER WINTER HABITAT CAPABILITY (NUMBER OF BIRDS) WITHIN ROADLESS AND ROADED AREAS IN EACH GEOZONE.

Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989	Geozone	Population from Roadless Areas	Population from Roaded Areas 1954	Population from Roaded Areas 1989
C01	636	1	0	K01	296	80	55	S01	2,603	5,257	2,317
C02	2,477	1,895	387	K02	35	0	0	S02	849	27	-
C03	36	0	0	K04	2,849	3,823	558	S03	770	2,439	398
C04	183	467	56	K05	951	0	0	S04	196	2,465	616
C05	411	286	39	K06	6,754	18,845	5,906	S05	151	2,393	513
C06	1,492	2,859	390	K07	5,357	0	0	S06	868	555	132
C07	3	0	0	K08	4,729	3,322	651	S07	329	767	183
C09	413	1,695	35	K09	1,441	-	153	S08	1,093	1,128	183
C10	383	2,780	121	K10	629	0	0	S09	1,003	721	70
C11	125	0	0	K11	2,038	10,775	3,730	S10	1,265	898	59
C12	479	0	0	K12	359	0	0	S11	637	64	0
C13	326	0	0	K13	5,725	0	0	S12	1,196	-	39
C14	172	0	0	K14	708	0	0	S13	203	3	3
C15	13,405	1,050	257	K15	241	0	0	S14	115	1,197	113
C16	187	0	0								
C17	263	0	0								
C18	816	319	41								
C20	985	2	1								
C21	844	35	16								
C22	1,471	158	0								
C23	1,702	377	24								
C24	2,432	511	201								
C25	2,176	2	0								
Total	31,417	12,437	1,568	Total	32,112	36,845	11,053	Total	11,278	17,914	4,626

Source: Revision Database, December 17, 1989.

Dash (-) indicates incomplete data due to GIS programming and/or data errors in roaded areas.

Vancouver Canada Goose

Table 3-192 displays the Vancouver Canada goose nesting and brood rearing habitat capability. At this time, 1954 habitat capability estimates are not available. the 1989 estimated habitat capability is 13,001 breeding and non-breeding adults. This habitat capability is low because the goose model could not be run for some of the wilderness areas, becuase plant association data in those areas is lacking. Information on roadless and roaded areas is also not available at this time (1989).

The U.S. Fish and Wildlife Service has estimated the Vancouver Canada goose population to be 10,000 birds. The habitat capability estimate suggests that nesting and brood rearing habitat may not be limiting to populations at this time. The estimate in Table 3-192 is low because of lack of data from several of the Wilderness areas, and additional nesting and brood rearing habitat exists on non-National Forest lands. Therefore, unused nesting habitat capability appears to be present, and other factors may be currently limiting the goose population.

TABLE 3-192

VANCOUVER CANADA GOOSE SPRING/SUMMER HABITAT CAPABILITY (NUMBER OF ADULT BREEDERS AND NON-BREEDERS) WITHIN EACH GEOZONE. 1/

Geozone	1954 Habitat Capability (# of Geese)	1989 Habitat Capability (# of Geese)	Geozone	1954 Habitat Capability (# of Geese)	1989 Habitat Capability (# of Geese)	Geozone	1954 Habitat Capability (# of Geese)	1989 Habitat Capability (# of Geese)
C01		149	K01		31	S01		789
C02		447	K02		98	S02		342
C03	-	-	K04		613	S03		940
C04		44	K05		387	S04		249
C05		153	K06		1,352	S05		277
C06		418	K07		460	S06		492
C07		30	K08		549	S07		202
C09		226	K09		204	S08		404
C10		443	K10		247	S09		432
C11		80	K11		452	S10		927
C12	-	-	K12		66	S11		186
C13	-	-	K13	-	-	S12	-	-
C14	-	-	K14	-	-	S13		120
C15	-	-	K15	-	-	S14		112
C16	-	-						
C17	-	-						
C18		169						
C20		171						
C21		102						
C22		18						
C23		356						
C24		32						
C25		205						
Total		3,050	Total		4,479	Total		5,472

Source: Revision Database October 31, 1989

1/ Several Wilderness Areas do not have plant association information in the GIS database at this time; therefore the habitat capability evaluations for these areas are unknown. The geozones which comprise these Wilderness Areas are: C03, C12, C13, C14, C15, C16, C17, C18, K13, K14, K15, S12.

Mountain Goat

At this time the GIS database still contains several errors in identifying cliffs and zones around cliffs for goat habitat. The program for running the goat model on the GIS also has a few bugs which have not been worked out. Therefore, habitat capability information is not available at this time (1989).

Moose

Table 3-193 summarizes estimated moose populations, current TLMP land use designations, and road access information for geozones with moose. The [illegible] post-hunt moose population for the Forest is 1,910 animals. There are 18 geozones with moose; seven of these geozones are currently in Wilderness areas (LUD 1), and eleven geozones have combinations of LUD 2, 3, and 4 designations. Portions of nine geozones are roaded. A total of 528.4 miles of permanent road exist in these geozones, with 183.7 of the road miles closed (35 percent). Three of the nine geozones have town or ferry access to these roads. Vegetation summaries for these 18 geozones have been previously presented in Tables 3.xx through 3.xx.

TABLE 3-193

SUMMARY OF ESTIMATED MOOSE POPULATIONS, CURRENT TLMP LAND USE DESIGNATION, ROAD AND ACCESS INFORMATION FOR GEOZONES WITH MOOSE.

	Geozone																	
	C14	C16	C17	C18	C22	C23	C24	C25	S01	S03	S04	S08	S09	S10	S11	S12	S13	K13
ESTIMATED POPULATION 1/	-	50	-	100	435	240	400	-	-	-	-	200	-	-	-	450	-	35
CURRENT TLMP ALLOCATION																		
LUD 1	Yes	Yes	Yes	-	-	-	-	-	-	-	-	-	-	-	Yes	Yes	Yes	Yes
LUD 2	-	-	-	Yes	Yes	Yes	Yes	-	Yes	-	-	Yes	-	Yes	-	-	-	-
LUD 3	-	-	-	Yes	Yes	-	Yes	Yes	-	Yes	Yes	Yes	Yes	Yes	-	-	-	-
LUD 4	-	-	-	-	-	-	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-	-	-
PERCENT ROADED	0	0	0	3	0 2/	0 2/	4	0 2/	26	26	57	4	2	7	0	1	0 2/	0
MILES OF ROAD 3/	0	0	0	32.5	16.9	0	51.6	0.9	156.5	125.3	123.3	21.4	0	0	0	0	0	0
PERCENT CLOSED	-	-	-	21	0	-	15	0	50	47	15	64	-	-	-	-	-	-
ACCESS TO FERRY OR TOWN	No	No	No	No	No	No	Yes	No	No	Yes	Yes	No	No	No	No	No	No	No

Source: USDA Forest Service, IDT

1/ This is the estimated post hunt moose population from Alaska Department of Fish and Game "Strategic Plan for Managment of Moose in Region I, Southeast Alaska, 1990-94." Public Review Draft, July 1989. Population estimates are not available for some geozones.

2/ A small portion of geozones C22, C23, C25 and S13 are classified as roaded, but the percentage of roaded area is less than one-half of one percent.

3/ Miles of road are for existing permanent roads. Non-permanent roads that are not being maintained and are being allowed to return to natural vegetation are not listed.

DEMAND ASSESSMENT
SITKA BLACK-TAILED DEER

Table 3-194 displays the number of deer harvested within Alaska Department of Fish and Game "Game Management Units" and "Major Harvest Units" for the period 1980 through 1988, excluding 1981, when no deer harvest data was collected. Only units which contain National Forest land are displayed in the table. Generally, the annual deer harvest has increased through the 1980's, from 5,690 deer harvested in 1980 to a high of 18,546 deer harvested in 1987. This represents a 226 percent increase over an eight-year period.

Deer harvests have not been evenly distributed throughout Southeast Alaska. Data in Table 3-195 show that of the total deer harvested from 1980-88, 73 percent were harvested in Game Management Unit 4, which includes Admiralty, Baranof, Chichagof and adjacent islands. Another 18 percent of the deer harvest occurred in Game Management Unit 2, which includes Prince of Wales Island and adjacent islands. Only one percent of the deer harvest has occurred in Game Management Unit 3, which includes Kuiu, Kupreanof, Mitkof, Zarembo, Etolin, Wrangell, and adjacent islands. About eight percent of the deer harvest has occurred on the mainland in Game Management Units 1A, 1B, and 1C.

Table 3-196 displays the number of deer hunters within the Game Management Units and Major Harvest Units for the period 1980 through 1988, excluding 1981 when no deer harvest data was collected. From 1980 through 1986, the number of deer hunters increased from 7,335 to 14,189; this represents a 93 percent increase. The number of deer hunters declined in 1987 and 1988, to 13,813 and 12,652, respectively.

The number of hunter-days follows the same trend as the number of hunters. From 1980 through 1986 the number of hunter-days increased from 31,380 to 67,243, a 114 percent increase. The number of hunter-days declined to 66,983 in 1987 and 49,356 in 1988.

The number of deer hunters and hunter-days have not been evenly distributed throughout Southeast Alaska. Between 1980 through 1988, a total of 55 percent of the deer hunters and hunter-days occurred in Game Management Unit 4, which includes Admiralty, Baranof, Chichagof and adjacent islands. Another 19 percent of the deer hunters and 23 percent of the hunter-days occurred in Game Management Unit 2, which includes Prince of Wales and adjacent islands. Twenty-two percent of the hunters and 18 percent of the hunter-days occurred in Game Management Units 1A, 1B, and 1C. Three percent of the hunters and two percent of the hunter-days occurred in Game Management Unit 3, which includes Kuiu, Kupreanof, Mitkof, Zarembo, Etolin, Wrangell and adjacent islands.

TABLE 3-194
ANNUAL SITKA BLACK-TAILED DEER HARVEST (NUMBER OF DEER KILLED) BY ADF&G GAME MANAGEMENT UNITS AND MAJOR HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST FOR YEARS 1980-1988 1/

Game Management Unit 1A

Major Harvest Units	1980	1982	1983	1984	1985	1986	1987	1988
100	165	120	150	205	186	294	62	136
300	- 2/	-	-	5	8	36	-	25
400	145	100	150	150	184	249	176	319
500	70	70	90	30	56	77	75	59
600	5	30	50	140	195	145	205	132
700	10	20	-	-	-	-	16	-
800	-	-	-	-	-	-	15	-
Total 1A	395	340	440	530	629	801	549	671

Game Management Unit 1B

Major Harvest Units	1980	1982	1983	1984	1985	1986	1987	1988
1600	10	-	-	-	25	48	23	42
1700	5	5	5	5	-	14	9	22
1800	10	-	15	-	13	8	28	37
Total 1B	25	5	20	5	38	70	60	101

Game Management Unit 1C

Major Harvest Units	1980	1982	1983	1984	1985	1986	1987	1988
2200	5	30	40	15	11	-	-	17
2300	10	30	10	-	19	-	8	6
2400	5	15	10	-	13	-	-	-
2500	35	25	50	10	12	21	18	17
2600	80	60	50	100	155	131	108	61
2700	100	120	230	270	317	265	348	319
2800	10	10	10	-	-	16	-	-
2900	-	-	-	-	-	-	3	9
Total 1C	245	290	400	399	527	433	485	429

Game Management Unit 2

Major Harvest Units	1980	1982	1983	1984	1985	1986	1987	1988
900	40	50	40	90	96	11	53	51
1000	30	80	60	70	199	103	109	126
1100	20	60	120	110	97	125	100	87
1200	75	50	110	110	175	194	242	205
1300	160	355	500	550	821	927	1,177	921
1400	130	270	420	430	1,029	547	1,212	799
1500	160	320	490	520	733	898	915	660
Total 2	615	1,185	1,740	1,880	3,150	2,805	3,808	2,849

Game Management Unit 3

Major Harvest Units	1980	1982	1983	1984	1985	1986	1987	1988
1900	90	70	80	130	160	187	74	223
2000	10	5	-	-	13	14	5	-
Total 3	100	75	80	130	173	201	79	223

TABLE 3-194
ANNUAL SITKA BLACK-TAILED DEER HARVEST (CONTINUED)

Major Harvest Units	1980	1982	1983	1984	1985	1986	1987	1988
Game Management Unit 4								
3000	800	1,160	1,410	1,810	1,847	1,659	2,012	2,1[illegible]
3100	250	380	610	470	599	643	877	671
3200	160	220	220	220	292	285	436	[illegible]
3300	300	370	790	910	1,128	960	1,987	1,666
3400	400	490	705	690	642	622	997	796
3500	420	590	810	800	1,165	1,901	1,861	1,832
3600	320	360	675	630	756	935	1,295	[illegible]
3700	110	210	360	350	408	421	376	645
3800	390	360	510	650	921	673	913	[illegible]
3900	275	580	850	680	788	772	795	947
4000	325	340	500	740	584	520	844	562
4100	560	570	920	950	1,260	1,063	1,172	1,00[illegible]
Total 4	4,310	5,630	8,360	8,900	10,390	10,254	13,565	11,929
Game Management Unit - Unknown								
Unknown	0	25	10	-	111	138	-	-
Total GMU's 1-4	5,690	7,550	11,050	11,844	15,018	14,702	18,546	16,202

Source: ADF&G, letters dated June 21, 1988 and September 2, 1988. 1988 ADF&G Deer Harvest Information.

1/ Deer harvest data was not collected by the Alaska Department of Fish and Game in 1981.

2/ Years without any data (designated by a -) reflect no recorded information.

TABLE 3-195
ANNUAL NUMBER OF SITKA BLACK-TAILED DEER HUNTERS BY ADF&G GAME MANAGEMENT UNITS AND MAJOR HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST FOR THE YEARS 1980-1988. 1/

Major Harvest Units	1980	1982	1983	1984	1985	1986	1987	1988
Game Management Unit 1A								
100	470	440	345	500	543	413	216	280
300	-2/	-	-	10	22	29	18	19
400	420	330	450	500	554	467	406	580
500	290	290	325	220	261	212	260	201
600	80	60	165	210	216	268	296	212
700	25	60	15	-	14	-	32	13
800	-	-	-	15	14	26	20	14
Total 1A	1,285	1,180	1,300	1,455	1,624	1,415	1,248	1,319
Game Management Unit 1B								
1600	50	15	30	10	40	54	43	106
1700	40	30	15	30	17	35	44	39
1800	30	20	35	30	43	30	68	43
Total 1B	120	65	80	70	100	119	155	188

TABLE 3XX

ANNUAL NUMBER OF SITKA BLACK-TAILED DEER HUNTERS (CONTINUED)

Game Management Unit 1C

Major Harvest Units	1980	1982	1983	1984	1985	1986	1987	1988
2200	5	40	25	15	28	5	17	16
2300	35	40	5	10	26	24	10	6
2400	15	20	30	30	32	15	5	-
2500	260	250	125	130	137	90	149	73
2600	190	290	140	170	252	311	184	162
2700	410	580	595	680	820	642	765	735
2800	15	50	30	20	13	22	-	-
2900	5	5	5	20	7	20	10	17
Total 1C	935	1,275	955	1,075	1,315	1,129	1,140	1,009

Game Management Unit 2

Major Harvest Units	1980	1982	1983	1984	1985	1986	1987	1988
900	60	80	55	110	103	63	78	80
1000	30	90	70	70	115	105	110	124
1100	30	116	170	100	99	117	101	109
1200	170	100	160	200	200	238	280	189
1300	180	370	520	700	807	978	958	922
1400	140	280	390	520	746	715	946	779
1500	125	260	360	480	588	713	805	557
Total 2	735	1,296	1,725	2,180	2,658	2,929	3,278	2,760

Game Management Unit 3

Major Harvest Units	1980	1982	1983	1984	1985	1986	1987	1988
1900	210	260	265	420	425	383	358	328
2000	30	35	20	20	46	29	21	-
Total 3	240	295	285	440	471	412	379	328

Game Management Unit 4

Major Harvest Units	1980	1982	1983	1984	1985	1986	1987	1988
3000	880	1,260	1,215	1,450	1,394	1,461	1,378	1,393
3100	280	490	550	480	526	483	541	524
3200	190	230	240	180	280	239	214	209
3300	330	460	615	590	616	597	794	834
3400	250	330	395	400	367	387	452	374
3500	280	430	525	490	546	941	802	811
3600	270	300	395	330	389	516	634	342
3700	100	150	220	200	203	247	240	251
3800	430	570	685	680	823	765	800	729
3900	210	460	515	430	409	535	423	469
4000	250	250	425	490	382	439	347	315
4100	550	730	880	860	970	983	988	797
Total 4	4,020	5,660	6,660	6,580	6,095	7,593	7,613	7,048

Game Management Unit - Unknown

	1980	1982	1983	1984	1985	1986	1987	1988
Unknown	0	70	110	300	0	592	-	-
Grand Total	7,335	9,841	11,115	12,100	12,263	14,189	13,813	12,652

Source: ADF&G, letters dated June 21, 1988 and September 2, 1988 1988 ADF&G Deer Harvest Information.

1/ ADF&G did not collect deer hunter data in 1981.

2/ Years without any data (designated by -) reflect no recorded information.

TABLE 3-196

ANNUAL NUMBER OF SITKA BLACK-TAILED DEER HUNTER-DAYS BY ADF&G GAME MANAGEMENT UNITS AND MAJOR HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST FOR YEARS 1980-1988. 1/

Major Harvest Units	Game Management Unit 1A							
	1980	1982	1983	1984	1985	1986	1987	1988
100	1,860	1,670	1,290	1,990	1,503	1,952	593	1,051
300	-2/	-	-	60	23	474	36	63
400	1,740	1,190	2,090	1,860	1,943	2,262	2,539	2,511
500	1,210	1,240	1,305	970	1,052	925	1,280	538
600	260	180	395	610	689	1,002	1,047	657
700	90	90	50	-	57	-	241	46
800	-	-	-	30	28	111	128	30
Total 1A	**5,160**	**4,370**	**5,130**	**5,520**	**5,295**	**6,726**	**5,864**	**4,896**

Major Harvest Units	Game Management Unit 1B							
	1980	1982	1983	1984	1985	1986	1987	1988
1600	240	30	100	20	198	380	301	354
1700	160	160	30	260	40	143	194	177
1800	90	70	70	150	121	38	194	59
Total 1B	**490**	**260**	**200**	**430**	**359**	**561**	**689**	**590**

Major Harvest Units	Game Management Unit 1C							
	1980	1982	1983	1984	1985	1986	1987	1988
2200	70	140	95	170	62	10	79	9
2300	80	120	35	10	20	47	25	6
2400	60	70	80	60	46	69	24	-
2500	810	760	265	400	212	289	309	243
2600	485	830	540	550	737	803	587	273
2700	1,190	1,850	2,000	2,270	2,840	2,559	2,609	2,299
2800	70	170	90	40	26	45	-	0
2900	5	40	5	110	35	13	33	100
Total 1C	**2,770**	**3,980**	**3,110**	**3,610**	**3,978**	**3,835**	**3,666**	**2,930**

Major Harvest Units	Game Management Unit 2							
	1980	1982	1983	1984	1985	1986	1987	1988
900	200	270	240	300	252	175	155	252
1000	190	390	285	280	1,074	415	332	282
1100	130	390	965	730	231	411	236	343
1200	790	680	475	1,050	1,894	1,219	1,629	769
1300	1,220	2,760	3,455	3,970	3,204	5,283	5,165	3,553
1400	1,120	2,540	3,170	3,650	4,723	4,458	5,669	3,100
1500	950	2,160	2,700	3,090	2,803	5,544	4,517	2,369
Total 2	**4,600**	**9,190**	**11,290**	**13,070**	**14,181**	**17,505**	**17,703**	**10,668**

Major Harvest Units	Game Management Unit 3							
	1980	1982	1983	1984	1985	1986	1987	1988
1900	780	1,000	1,145	1,400	1,033	1,128	769	1,371
2000	60	140	65	40	105	69	48	-
Total 3	**840**	**1,140**	**1,210**	**1,440**	**1,138**	**1,197**	**817**	**1,371**

TABLE 3-196
ANNUAL SITKA BLACK-TAILED-DEER HUNTER DAYS (CONTINUED)

Major Harvest Units	Game Management Unit 4							
	1980	1982	1983	1984	1985	1986	1987	1988
3000	3,920	6,770	6,200	6,660	4,889	7,312	7,621	[illegible]
3100	910	1,540	2,245	1,760	1,524	1,640	[illegible]	[illegible]
3200	530	850	870	670	754	726	[illegible]	[illegible]
3300	1,100	1,610	2,660	2,240	2,050	2,339	3,818	3,079
3400	1,280	1,650	1,575	1,870	1,861	1,598	2,017	1,815
3500	1,740	3,690	3,640	2,930	2,247	5,916	[illegible]	[illegible]
3600	1,360	1,370	2,120	1,460	1,573	[illegible]	[illegible]	[illegible]
3700	280	540	860	940	655	943	955	864
3800	1,860	2,120	2,275	2,380	2,834	2,739	3,561	2,349
3900	960	2,260	2,460	1,800	1,832	2,314	1,870	2,090
4000	1,140	1,190	2,360	2,890	1,397	1,568	1,713	1,255
4100	2,440	2,970	3,765	3,110	3,568	3,304	3,924	3,640
Total 4	17,520	26,560	31,030	28,710	25,184	33,415	38,244	28,901
	Game Management Unit Unknown							
Unknown	0	240	580	1,750	124	4,004	-	-
Grand Total	31,380	45,740	52,550	54,530	50,259	67,243	66,983	49,356

Source: ADF&G letters dated June 21, 1988 and September 2, 1988. 1988 ADF&G Deer Harvest Information.

1/ Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter day is equal to one person hunting for any length of time during a 24-hour period. A person hunting for one hour is the equivalent of one hunter day, and a person hunting for eight hours is the equivalent of one hunter day. Data was not collected by the Alaska Department of Fish and Game in 1981.

2/ Years without any data (designated by a -) reflect no recorded information.

The large increases in deer hunting activity and the distribution of this activity during the 1980 - 1988 period are generally associated with the following factors: 1) Deer populations were low in the late 1970's following some hard winters; deer populations increased during the 1980's with less harsh winter weather patterns. 2) A majority of Southeast Alaska's human population resides in the northern portion of the Forest where Game Management Unit 4 is located; hence, more hunting activity would naturally occur there. 3) Deer populations increased faster in areas without wolf populations. (The area without wolf population coincides with Game Management Unit 4.) Deer harvest seasons have been either sex in Game Management Unit 4. Due to slower and lower increases in the deer populations, deer harvest in other game management units has been either closed or only antlered animals have been hunted. 4) Hunting activity is highest in Game Management Units which are close to towns and/or have roads accessible by ferry. In 1988, 64 percent of the hunters hunted in ten of 39 Major Harvest Units (MHU's: 400, 1300, 1400, 1500, 2700, 3000, 3300, 3500, 3800, 4100). MHU's 400, 2700 and 3000 include the three largest cities in Southeast Alaska. MHU's 1300, 1400, 1500, and 3500 have ferry access and road systems. MHU's 3300, 3800, and 4100 are close to towns of Juneau and Sitka, and therefore, receive higher hunting activity.

Table 3-197 illustrates the average number of hunter-days spent to harvest one deer for each of the Game Management Units between 1980 and 1988. The general trend through the 1980's has been that it has taken fewer days to harvest a deer with each succeeding year. It has taken the fewest days to harvest a deer in Game Management Unit 4.

TABLE 3-197
AVERAGE NUMBER OF HUNTER-DAYS TO HARVEST ONE DEER WITHIN ADF&G GAME MANAGEMENT UNITS, 1980 - 1988 1/

Game	Year							
Management Unit	1980	1982	1983	1984	1985	1986	1987	1988
1A	13.1	12.8	11.7	10.4	8.4	8.4	10.7	7.3
1B	19.6	52.0	10.0	86.0	9.1	8.0	11.7	7.5
1C	11.3	13.7	7.8	9.0	7.5	8.9	7.2	6.8
2	7.5	7.8	6.5	6.9	4.5	6.2	4.6	3.7
3	8.4	15.2	15.1	11.1	6.6	6.0	10.3	6.1
4	4.1	4.7	3.7	3.2	2.4	3.3	2.8	2.4

1/ Data compiled by dividing the number of hunter-days in Table 3-196 by the number of deer harvested in Table 3-194.

Table 3-198 illustrates the average number of deer killed per hunter for the period between 1980 and 1988 for each of the Game Management Units. The general trend through the 1980's has been that the number of deer harvested per hunter has increased with each succeeding year. The highest number of deer harvested occurred in Game Management Unit 4.

TABLE 3-198
AVERAGE NUMBER OF DEER KILLED PER HUNTER WITHIN ADF&G GAME MANAGEMENT UNITS, 1980 - 1988. 1/

Game	Year							
Management Unit	1980	1982	1983	1984	1985	1986	1987	1988
1A	.3	.3	.3	.4	.4	.6	.4	.5
1B	.2	.1	.3	.1	.4	.6	.4	.5
1C	.3	.2	.4	.4	.4	.4	.4	.4
2	.8	.9	1.0	.9	1.2	1.0	1.2	1.0
3	.4	.3	.3	.3	.4	.5	.2	.7
4	1.1	1.0	1.3	1.4	1.7	1.4	1.8	1.7

1/ Data compiled by dividing the number of deer killed in Table 3-194 by the number of hunters in Table 3-195.

Prior to 1987, deer harvest data were only collected for Major Harvest Units and Game Management Units. Beginning in 1987, deer harvest data were collected for smaller land units which ADF&G terms "Minor Harvest Units." In 1988, ADF&G made several changes to the boundaries of the Minor Harvest Units and renamed these units "Wildlife Analysis Areas." Tables 3-199, 3-200 and 3-201 display number of deer harvested, number of deer hunters, and number of deer hunter-days for those Minor Harvest Units and Wildlife Analysis Areas which contain National Forest lands. Units which are not within National Forest lands are not included in these tables. Deer were harvested in a total of 133 units or areas. In 1988, more than 200 deer were harvested in each of 26 units. These 26 units accounted for 59 percent of the total deer harvested in 1988. The same 26 units also accounted for 54 percent of the total deer hunters and deer hunter-days in 1988.

TABLE 3-199
NUMBER OF SITKA BLACK-TAILED DEER HARVESTED BY ADF&G MINOR HARVEST UNITS (MHU) (1987) AND WILDLIFE ANALYSIS AREAS (WAA) (1988) WITHIN THE TONGASS NATIONAL FOREST 1/

Game Management Unit 1A

	Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
	MHU Number	Harvest	WAA Number	Harvest
	101	62	101	136
	303	0	303	25
	404	31	404	13
	405	10	405	26
	406	62	406	104
	407	73	407	104
	408	0	408	72
	509	64	509	59
	510	10	510	0
	612	66	612	61
	613	132	613	61
	614	7	614	10
	715	16	715	0
	821	10	821	0
	822	0	822	0
	823	5	823	0
Total 1A		548		671

Game Management Unit 1B

	Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
	MHU Number	Harvest	WAA Number	Harvest
	1601	0	1601	0
	1602	0	1602	0
	1603	0	1603	0
	1605	23	1605	42
	1706	9	1706	11
	1707	0	1707	11
	1708	0	1708	0
	1810	0	1810	12
	1811	0	1811	0
	1812	0	1812	0
	1813	0	1813	0
	1817	28	1817	25
Total 1B		60		101

Game Management Unit 1C

	Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
	MHU Number	Harvest	WAA Number	Harvest
	2202	0	2202	17
	2305	8	2305	6
	2306	0	2306	0
	2409	0	2409	0
	2514	0	2514	0
	2515	0	2515	0
	2517	18	2517	17
	2620	37	2620	25
	2621	71	2621	36
	2722	348	2722	319
	2824	0	2824	13
	2926	3	2926	9
Total 1C		485		442

TABLE 3-199
NUMBER OF SITKA BLACK-TAILED DEER HARVESTED BY ADF&G MINOR HARVEST UNIT
(CONTINUED)

Game Management Unit 2

Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
MHU Number	Harvest	WAA Number	Harvest
901	47	901	40
902	6	902	11
1003	109	1003	126
1105	6	1105	0
1106	50	1106	37
1107	39	1107	50
1108	5	1108	0
1209	0	1209	0
1210	36	1210	13
1211	51	1211	79
1212	40	1212	20
1213	5	1213	0
1214	110	1214	93
1315	209	1315	130
1316	127	1316	77
1317	120	1317	28
1318	468	1318	347
1319	253	1319	243
		1320	21
		1321	75
1420	244	1420	186
1421	499	1421	329
1422	468	1422	284
1524	6	1524	5
1525	80	1525	48
1526	88	1526	114
1527	403	1527	43
1528	71	1528	63
1529	267	1529	146
		1530	202
		1531	40
Total 2	3,807		2,850

Game Management Unit 3

Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
MHU Number	Harvest	WAA Number	Harvest
1901	18	1901	0
1902	0	1902	0
1903	24	1903	42
1904	49	1904	120
1905	9	1905	11
1906	24	1906	38
		1908	12
2007	5	2007	0
2010	0	-	-
2014	0	-	-
-	-	5015	11
-	-	5134	0
-	-	5135	0
TOTAL 3	129		240

TABLE 3-199
NUMBER OF SITKA BLACK-TAILED DEER HARVESTED BY ADF&G MINOR HARVEST UNITS (CONTINUED)

Game Management Unit 4			
Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
MHU Number	Harvest	WAA Number	Harvest
3001	1,100	3001	1,028
3002	415	3002	592
3003	497	3003	489
3104	539	3104	559
3105	338	3105	111
3206	265	3206	146
3207	171	3207	148
		3306	228
3312	223	3312	180
3313	197	3313	125
3315	188	3315	184
3731	122	3731	439
3732	19	3732	5
3733	128	3733	114
3734	108	3734	87
Subtotal Baranof	4,310		4,435
3308	355	3308	187
3309	176	3309	161
3310	369	3310	272
3311	479	3311	330
3416	152	3416	148
3417	354	3417	268
3418	120	3418	78
3419	213	3419	100
3420	158	3420	104
		3421	98
3521	117	3521	106
3522	278	3522	156
3523	1,120	3523	184
3524	247	3524	444
		3525	364
		3531	145
		3532	316
		3533	118
3625	492		
3626	221	3626	219
3627	42	3627	112
3628	40	3628	71
3629	399	3629	232
3630	100	3630	31
Subtotal Chichagof	5,532		4,244

TABLE 3-199 *
NUMBER OF SITKA BLACKTAILED DEER HARVESTED IN ADF&G MINOR HARVEST UNITS
(CONTINUED)

Game Management Unit 4 (Continued)			
Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
MHU Number	Harvest	WAA Number	Harvest
3835	429	3835	286
3836	447	3836	390
3837	37	3837	63
3938	248	3938	316
3939	368	3939	427
3940	178	3940	204
4041	304	4041	27
4042	294	4042	135
4043	144	4043	91
4044	102	4044	111
		4045	82
		4046	116
4145	137	4145	100
4146	206	4146	135
4147	529	4147	125
4148	300	4148	112
		4149	141
		4150	391
Subtotal Admiralty	**3,723**		3,252
Total GMU 4	**13,565**		**11,931**
GRAND TOTAL	18,594		16,235

Source: Alaska Department of Fish and Game, letter dated September 2, 1988, 1988 ADF&G Deer Harvest Information.

1/ Prior to 1987, deer harvest data was collected on a "major harvest unit" basis. Beginning in 1987, data was collected by minor harvest units. In 1988, ADF&G adjusted several of its minor harvest units by dividing large units into two or more smaller units; the name was also changed from "minor harvest unit" to "wildlife analysis area." Two sets of maps are thus required to understand the harvest information: a 1987 minor harvest unit map, and a 1988 wildlife analysis area map.

TABLE 3-200
NUMBER OF SITKA BLACK-TAILED DEER HUNTERS BY ADF&G. MINOR HARVEST UNITS (MHU) (1987) AND WILDLIFE ANALYSIS AREAS (WAA) (1988) WITHIN THE TONGASS NF 1

Game Management Unit 1A

	Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
	MHU Number	Hunters	WAA Number	Hunters
	101	229	101	280
	303	36	303	19
	404	57	404	13
	405	36	405	85
	406	138	406	208
	407	252	407	270
	408	0	408	242
	509	208	509	193
	510	73	510	21
	612	151	612	100
	613	196	613	133
	614	0	614	5
	715	32	715	7
	719	0	719	7
	820	0	820	7
	821	5	821	0
	822	9	822	1
	823	10	823	7
Total		1,432		1,598

Game Management Unit 1B

	Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
	MHU Number	Hunters	WAA Number	Hunters
	1601	5	1601	0
	1602	2	1602	5
	1603	5	1603	11
	1605	36	1605	95
	1706	27	1706	11
	1707	6	1707	17
	1708	11	1708	12
	1810	6	1810	12
	1811	6	1811	0
	1812	6	1812	0
	1813	12	1813	0
	1817	44	1817	31
Total		166		194

Game Management Unit 1C

Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
MHU Number	Hunters	WAA Number	Hunters
2202	17	2202	16
2305	8	2305	6
2306	2	2306	0
2409	5	2409	0
2514	73	2514	25
2515	55	2515	12
2517	47	2517	36
2620	83	2620	38
2621	134	2621	131
2722	765	2722	735

TABLE -200
NUMBER OF SITKA BLACK-TAILED DEER HUNTERS BY ADF&G MINOR HARVEST UNIT (CONTINUED)

	2823	0	2823	13
	2824	0	2824	25
	2926	10	2926	12
	2927	0	2927	5
Total		1,199		1,054

Game Management Unit 2

	Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
	MHU Number	Hunters	WAA Number	Hunters
	901	47	901	67
	902	31	902	40
	1003	110	1003	124
	1105	16	1105	5
	1106	25	1106	33
	1107	65	1107	79
	1108	5	1108	7
	1209	9	1209	7
	1210	37	1210	31
	1211	95	1211	62
	1212	63	1212	9
	1213	21	1213	33
	1214	148	1214	73
	1315	236	1315	203
	1316	56	1316	101
	1317	172	1317	53
	1318	425	1318	404
	1319	354	1319	300
			1320	47
			1321	86
	1420	228	1420	178
	1421	499	1421	310
	1422	583	1422	397
	1524	6	1524	11
	1525	69	1525	38
	1526	103	1526	106
	1527	472	1527	53
	1528	91	1528	65
	1529	243	1529	155
			1530	199
			1531	30
Total 2		4,209		3,306

Game Management Unit 3

Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
MHU Number	Hunters	WAA Number	Hunters
1901	59	1901	13
1902	6	1902	12
1903	122	1903	115
1904	160	1904	190
1905	21	1905	11
1906	67	1906	35
		1908	30
2007	5	2007	0
2010	14		
2014	5		

TABLE 3-200
NUMBER OF SITKA BLACK-TAILED DEER HUNTERS BY ADF&G MINOR HARVEST UNITS
(CONTINUED)

			5015	8
			5016	6
			5134	6
			5135	6
TOTAL 3		459		432

Game Management Unit 4

	Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
	MHU Number	Hunters	WAA Number	Hunters
	3001	878	3001	797
	3002	570	3002	598
	3003	506	3003	534
	3104	439	3104	475
	3105	179	3105	93
	3206	131	3206	104
	3207	99	3207	105
			3306	204
	3312	156	3312	164
	3313	136	3313	97
	3315	101	3315	98
	3731	114	3731	131
	3732	19	3732	5
	3733	63	3733	77
	3734	71	3734	48
Subtotal Baranof		**3,462**		3,530
	3308	193	3308	119
	3309	128	3309	105
	3310	155	3310	235
	3311	370	3311	231
	3416	119	3416	93
	3417	197	3417	144
	3418	82	3418	51
	3419	136	3419	61
	3420	63	3420	49
			3421	55
	3521	63	3521	70
	3522	120	3522	79
	3523	506	3523	146
	3524	214	3524	313
			3525	231
			3531	130
			3532	171
			3533	96
	3625	301		
	3626	185	3626	165
	3627	56	3627	87
	3628	56	3628	45

TABLE 3-200
NUMBER OF SITKA BLACK-TAILED DEER HUNTERS BY ADF&G MINOR HARVEST UNITS
(CONTINUED)

3629	157	3629	132
3630	73	3630	8
3835	450	3835	220
3836	431	3836	435
3837	54	3837	63
3938	190	3938	185
3939	198	3939	221
3940	127	3940	100
4041	120	4041	20
4042	107	4042	73
4043	105	4043	82
4044	95	4044	89
		4045	32
		4046	60
4145	89	4145	82
4146	110	4146	97
4147	647	4147	93
4148	229	4148	68
		4149	140
		4150	430
Subtotal Admiralty	2,952		2,590
Total GMU 4	9,588		8,949
GRAND TOTAL	17,053		15,533

Source: Alaska Department of Fish and Game, letter dated September 2, 1988, 1988 ADF&G Deer Harvest Information

1/ Prior to 1987, deer harvest data was collected on a "major harvest unit" basis. Beginning in 1987, data was collected by minor harest units. In 1988, ADF&G asjusted several of its minor harvest units by dividing large units into two or more smaller units; the name was also changed from "minor harvest unit" to "wildlife analysis area." Two sets of maps are thus required to understand the harvest information: A 1987 harvest unit map and a 1988 wildlife analysis area map.

TABLE 3-201

NUMBER OF SITKA BLACK-TAILED DEER HUNTER-DAYS (H. DAYS) BY ADF&G MINOR HARVEST UNITS (MHU) (1987) AND WILDLIFE ANALYSIS AREAS (WAA) (1988) WITHIN THE TONGASS NATIONAL FOREST 1/

Game Management Unit 1A

Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
MHU Number	Hunter-Days	WAA Number	Hunter-Days
101	593	101	1,051
303	36	303	63
404	406	404	33
405	365	405	182
406	759	406	480
407	936	407	1,066
408	72	408	750
509	1,063	509	510
510	217	510	28
612	413	612	227
613	577	613	398
614	57	614	33
715	241	715	26
719	0	719	20
820	0	820	20
821	15	821	0
822	5	822	4
823	108	823	7
Total 1A	**5,863**		4,898

Game Management Unit 1B

Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
MHU Number	Hunter-Days	WAA Number	Hunter-Days
1601	9	1601	0
1602	2	1602	26
1603	136	1603	11
1605	154	1605	317
1706	72	1706	21
1707	30	1707	65
1708	92	1708	91
1810	18	1810	12
1811	0	1811	0
1812	36	1812	0
1813	18	1813	0
1817	123	1817	47
Total 1B	**690**		590

Game Management Unit 1C

Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
MHU Number	Hunter-Days	WAA Number	Hunter-Days
2202	79	2202	9
2305	13	2305	6
2306	12	2306	0
2409	24	2409	0
2514	149	2514	82
2515	76	2515	100
2517	84	2517	62

TABLE 3-201
NUMBER OF SITKA BLACK-TAILED DEER HUNTER-DAYS (H. DAYS) BY ADF&G MINOR HARVEST UNITS (MHU) (1987) AND WILDLIFE ANALYSIS AREAS (WAA) (1988) (Continued)

Game Management Unit 1C (Continued)

	Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
	MHU Number	Hunter-Days	WAA Number	Hunter Days
	2620	190	2620	50
	2621	397	2621	223
	2722	2,609	2722	2,299
	2823	0	2823	13
	2824	0	2824	50
	2926	33	2926	90
	2927	0	2927	11
Total 1C		**3,666**		**2,995**

Game Management Unit 2

	Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
	MHU Number	Hunter-Days	WAA Number	Hunter-Days
	901	100	901	168
	902	55	902	84
	1003	332	1003	282
	1105	32	1105	5
	1106	79	1106	79
	1107	114	1107	253
	1108	10	1108	7
	1209	18	1209	7
	1210	183	1210	109
	1211	531	1211	278
	1212	155	1212	9
	1213	57	1213	52
	1214	685	1214	314
	1315	945	1315	814
	1316	367	1316	251
	1317	430	1317	69
	1318	1,718	1318	1,311
	1319	1,704	1319	671
			1320	111
			1321	327
	1420	1,123	1420	701
	1421	2,217	1421	955
	1422	2,329	1422	1,444
	1524	6	1524	21
	1525	377	1525	237
	1526	387	1526	332
	1527	2,320	1527	175
	1528	352	1528	215
	1529	1,076	1529	423
			1530	848
			1531	119
Total 2		**17,702**		**10,671**

TABLE 3-201
NUMBER OF SITKA BLACK-TAILED DEER HUNTER-DAYS (H. DAYS) BY ADF&G MINOR HARVEST UNITS (MHU) (1987) AND WILDLIFE ANALYSIS AREAS (WAA) (1988) (CONTINUED)

Game Management Unit 3

	Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
	MHU Number	Hunter-Days	WAA Number	Hunter-Days
	1901	135	1901	25
	1902	6	1902	24
	1903	400	1903	521
	1904	435	1904	396
	1905	40	1905	30
	1906	187	1906	236
			1908	139
	2007	5	2007	0
	2010	41		
	2014	3		
			5015	23
			5016	0
			5134	18
			5135	6
Total 3		1,252		1,418

Game Management Unit 4

	Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
	MHU Number	Hunter-Days	WAA Number	Hunter-Days
	3001	3,593	3001	2,192
	3002	2,543	3002	2,165
	3003	1,485	3003	1,162
	3104	1,606	3104	1,264
	3105	482	3105	123
	3206	270	3206	236
	3207	296	3207	796
			3306	452
	3312	374	3312	306
	3313	326	3313	194
	3315	290	3315	284
	3731	339	3731	520
	3732	43	3732	11
	3733	200	3733	147
	3734	373	3734	186
Subtotal Baranof		12,220		10,038
	3308	745	3308	409
	3309	354	3309	261
	3310	424	3310	668
	3311	1,305	3311	505
	3416	241	3416	229
	3417	781	3417	618
	3418	289	3418	161
	3419	462	3419	371
	3420	244	3420	305
			3421	131
	3521	345	3521	194
	3522	1,034	3522	180
	3523	4,123	3523	509

TABLE 3-201
NUMBER OF SITKA BLACK-TAILED DEER HUNTER-DAYS (H. DAYS) BY ADF&G MINOR HARVEST UNITS (MHU) (1987) AND WILDLIFE ANALYSIS AREAS (WAA) (1988) (CONTINUED)

Game Management Unit 4 (Continued)

Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
MHU Number	Hunter-Days	WAA Number	Hunter-Days
3524	905	3524	1,285
		3525	913
		3531	378
		3532	686
		3533	161
3625	1,546		
3626	833	3626	825
3627	168	3627	203
3628	203	3628	109
3629	604	3629	417
3630	349	3630	59
Subtotal			
Chichagof	14,955		9,577

Game Management Unit 4 (Continued)

Minor Harvest Unit (1987)		Wildlife Analysis Area (1988)	
MHU Number	Hunter-Days	WAA Number	Hunter Days
3835	1,747	3835	882
3836	1,624	3836	1,241
3837	191	3837	226
3938	639	3938	856
3939	913	3939	936
3940	318	3940	298
4041	549	4041	45
4042	492	4042	258
4043	362	4043	257
4044	310	4044	259
		4045	66
		4046	370
4145	513	4145	408
4146	390	4146	912
4147	2,208	4147	516
4148	813	4148	261
		4149	443
		4150	1,100
Subtotal			
Admiralty	11,069		9,334
Total GMU 4	38,244		28,949
GRAND TOTAL	67,417		49,521

Source: Alaska Department of Fish and Game, letter dated September 2, 1988, 1988 ADF&G Deer Harvest Information

1/ Prior to 1987, deer harvest data was collected on a "major harvest unit" basis. Beginning in 1987, data was collected by minor harvest units. In 1988, ADF&G adjusted several of its minor harvest units by dividing large units into two or more smaller units; the name was also changed from "minor harvest unit" to "wildlife analysis area." Two sets of maps are thus required to understand the harvest information: a 1987 minor harvest unit map and a 1988 wildlife analysis area map.

Hunter-Days are compiled by the Alaska Department of Fish and Game; one hunter day is equivalent to one person hunting for any length of time during a 24-hour period. A person hunting for one hour is the equivalent of one hunter-day, and a person hunting for 8 hours is the equivalent of one hunter day.

DEER HARVEST IN RELATION TO HABITAT CAPABILITY

Since habitat capability information was developed on a Geozone basis, and deer harvest information was developed by ADF&G by harvest units, some work needed to be done to get both sets of data to a common unit. Tables 3-202 and 3-203 display how the Minor Harvest Units (MHU's) and Wildlife Analysis Areas (WAA's) are distributed within the Geozones. Several of the Minor Harvest Units and Wildlife Analysis Areas are split between two or more geozones, or also encompass non-National Forest lands. For these split MHU's and WAA's, Tables 3-204 and 3-205 display the percentage of the area split between Geozones and/or non-National Forest lands. These percentages were used to allocate the 1987 and 1988 deer harvest from these MHU's and WAA's to the Geozones. Table 3-206 displays the 1987 and 1988 deer harvest for each Geozone.

Flynn (1989) provides a rationale for a sustainable harvest rate for use in deer habitat and population management planning in Southeast Alaska. He conducted simulations of deer populations using a deterministic model (POP-II, Fossil Creek Software, Fort Collins, CO) with available data from Southeast Alaska. The computer simulations indicated that finite rates of increase for deer in Southeast Alaska ranged from 0.91 to 1.24. Finite rates of increase above 1.2 would occur only when fawn recruitment (healthy fawn populations) and adult survival are high, such as when populations are below carrying capacity and mild winter conditions exist. In high density populations near carrying capacity, the finite rate of increase would be about 1.09 or perhaps lower. Moderately severe winters would cause deer populations to decrease at the rate of 10 percent or more. Rates of population increase can be used to estimate sustainable harvest rates. A population can be harvested at the same rate as the rate the population would increase in the absence of hunter harvesting (Flynn 1989, Caughley 1977).

The winter deer habitat capabilities estimated by the habitat capability model (Suring 1988) assumed a residual winter population of about 90 percent of carrying capacity. Thus the habitat capabilities estimated by the model allow for a hunter yield from the population. Flynn (1989) suggests that a harvest rate of 10 percent should be used in land use and population management planning in Southeast Alaska.

TABLE 3-202

ALASKA DEPARTMENT OF FISH AND GAME "MINOR HARVEST UNITS" OCCURRING WITHIN EACH FORPLAN GEOZONE.

GEOZONE	ADF&G "MINOR HARVEST UNITS"
C01	3420, 3419(p), 3418(p), 3521(p)
C02	3522(n), 3523(n), 3524(n), 3625
C03	3418(p), 3419(p), 3417(p)
C04	3626, 3630(p)
C05	3311(p), 3310(p)
C06	3308, 3309, 3627, 3628, 3629, 3630(p)
C07	3521(p)
C09	3312(p), 3313, 3315, 3731, 3732
C10	3312(p), 3001, 3002, 3003, 3104, 3105, 3206
C11	3734
C12	3311(p), 3416, 3417(p), 3310(p)
C13	3207, 3733
C14	2824, 2825(p)
C15	3837, 4041, 4042(n), 4043, 4044(n), 3938, 3939, 3940, 4145, 4146, 4147, 4148
C16	2203
C17	4607, 4506, 4505(p), 4503(p)
C18	2305, 2306, 2304
C20	3835, 3836
C21	2514, 2515(p), 2517(p,n), 2722(n), 2620, 2621, 2519(p)
C22	4503(p), 4505(p)
C23	2517(p,n), 2202, 4407, 4408, 2408, 2409, 2410, 2411, 2412, 2413, 2516, 2518, 2519(p), 2823, 2515(p)
C24	4504, 4503(p,n)
C25	2825(p), 2926(n), 2927
K01	826, 825(p)
K02	303
K04	101(n), 405, 406, 407(n), 408(n), 509, 510
K05	612, 613, 614(n), 1817
K06	1318(p), 1315(n), 1316(p), 1319, 1420, 1421, 1422(p), 1527(p), 1528, 1529(p)
K07	1209, 1210, 1211(n), 1212, 1213(p)
K08	1316(p), 1213(p), 1214(n), 1107(n), 1317, 1318(p,n), 1106(n)
K09	1105(n), 901
K10	902
K11	1422(p), 1527(p), 1529(p), 1003, 1525, 1526
K12	715
K13	825(p), 820, 821, 822, 823, 824, 716, 717, 718, 719, 404, 511
K14	1108
K15	1524, 2015
S01	2012, 2013, 2014(p)
S02	2014(p)
S03	2011(n), 2009(p)
S04	2007
S05	1905
S06	1901
S07	1903
S08	1601, 1602, 1603, 1604, 1605(p)
S09	1809, 1810, 1811, 1812, 1813, 1814, 1815, 1816
S10	2008, 2010
S11	2014(p)
S12	1605(p), 1706, 1707, 1708
S13	2009(p)
S14	1904, 1906, 1902

A (p) indicates a portion of the area is within two or more geozones; an (n) indicates a portion of the area is non-National Forest land.

TABLE 3-203

ALASKA DEPARTMENT OF FISH AND GAME "WILDLIFE ANALYSIS AREAS" OCCURRING WITHIN EACH FORPLAN GEOZONE.

Geozone	ADF&G "Wildlife Analysis Areas"
C01	3421, 3420, 3419(p), 3418(p), 3521(p)
C02	3522, 3532(n), 3523(n), 3531, 3524(n), 3625, 3533
C03	3418(p), 3419(p), 3417(p)
C04	3626
C05	3311(p), 3310(p), 3309(p)
C06	3308, 3309(p), 3627, 3628, 3629, 3630
C07	3521(p)
C09	3312(p), 3313, 3315, 3731, 3732
C10	3312(p), 3306, 3001, 3002, 3003, 3104, 3105, 3206
C11	3734
C12	3311(p), 3416, 3417(p), 3310(p)
C13	3207, 3733
C14	2824, 2825(p)
C15	3837, 4041, 4042(n), 4043, 4044(n), 4045, 4046, 3938, 3939, 3940, 4145,4146, 4147, 4148, 4149, 4150
C16	2203
C17	4607, 4506, 4505(p), 4503(p)
C18	2305, 2306, 2304
C20	3835, 3836
C21	2514, 2515(p), 2517(p,n), 2722(n), 2620, 2621, 2519(p)
C22	4503(p), 4505(p)
C23	2517(p), 2202, 4407, 4408, 2408, 2409, 2410, 2411, 2412, 2413, 2516, 2518, 2519(p), 2823, 2515(p)
C24	4504, 4503(p,n)
C25	2825(p), 2926(n), 2927
K01	826, 825(p)
K02	303
K04	101(n), 405, 406, 407(n), 408(n), 509, 510
K05	612, 613, 614(n), 1817
K06	1315(n), 1316(p), 1319, 1420, 1421, 1422, 1527(p),1528, 1529(p), 1321, 1530
K07	1209, 1210, 1211(n), 1212, 1213(p)
K08	1316(p), 1213(p), 1214(n), 1107(n), 1317, 1318(n), 1106(n), 1320(n)
K09	1105(n), 901
K10	902
K11	1527(p), 1529(p), 1003, 1525, 1526, 1531
K12	715
K13	825(p), 820, 821, 822, 823, 824, 716, 717, 718, 719, 404, 511
K14	1108
K15	1524, 5015
S01	5012,5013,5018,5014
S02	5017
S03	5132(n), 5131, 5133(p), 5135, 5136, 5138
S04	2007, 2009
S05	1905
S06	1901, 1908
S07	1903
S08	1601, 1602, 1603, 1604, 1605(p)
S09	1809, 1810, 1811, 1812, 1813, 1814, 1815, 1816
S10	2008, 5134, 5130, 5133(p)
S11	5016
S12	1605(p), 1706, 1707, 1708
S13	5137
S14	1904, 1906, 1902

A (p) indicates a portion of the area is within two geozones; an (n) indicates a portion of the area is non-National Forest land.

TABLE 3-204
THE PROPORTION OF EACH ADF&G MINOR HARVEST UNIT (MHU) IN GEOZONES AND NON-NATIONAL FOREST LANDS, WHERE THE MHU'S ARE SPLIT BY TWO OR MORE GEOZONES OR NON-NATIONAL FOREST LANDS.

MHU	% of MHU in Geozones within National Forest Percent	Geozone	% of MHU within Non-National Forest Land
101	60	K04	40
407	50	K04	50
408	50	K04	50
614	70	K05	30
825	20	K01	
	80	K13	
1105	60	K09	40
1106	20	K08	80
1107	40	K08	60
1211	70	K07	30
1213	70	K07	
	30	K08	
1214	70	K08	30
1315	60	K06	40
1316	50	K06	
	50	K08	
1318	20	K06	72
	8	K08	
1422	90	K06	
	10	K11	
1527	60	K06	
	40	K11	
1529	90	K06	
	10	K11	
1605	70	S08	
	30	S12	
2009	70	S03	
	30	S13	
2011	80	S03	20
2014	40	S01	
	40	S02	
	20	S11	
2515	80	C21	
	20	C23	
2517	28	C21	42
	30	C23	
2519	10	C21	
	90	C23	
2722	50	C21	50
2825	90	C14	
	10	C25	
2926	70	C25	30
3310	80	C05	
	20	C12	
3311	90	C05	
	10	C12	
3312	30	C09	
	70	C10	

TABLE 3-204

THE PROPORTION OF EACH ADF&G MINOR HARVEST UNIT (MHU) IN GEOZONES

MHU	% of MHU in Geozones within National Forest Percent	Geozone	% of MHU within Non-National Forest Land
3417	10	C03	
	90	C12	
3418	30	C01	
	70	C03	
3419	90	C01	
	10	C03	
3521	30	C01	
	70	C07	
3522	90	C02	10
3523	70	C02	30
3524	70	C02	30
3630	20	C04	
	80	C06	
4042	90	C15	10
4044	70	C15	30
4503	10	C17	6
	60	C22	
	24	C24	
4504			100
4505	60	C17	
	40	C22	

TABLE 3-205

THE PROPORTION OF EACH ADF&G WILDLIFE ANALYSIS AREA (WAA) IN GEOZONES AND NON-NATIONAL FOREST LANDS, WHERE THE WAA'S ARE SPLIT BY TWO OR MORE GEOZONES OR NON-NATIONAL FOREST LANDS.

WAA	% of WAA in Geozones within National Forest Percent	Geozone	% of WAA within Non-National Forest Land
101	60	K04	40
407	50	K04	50
408	50	K04	50
614	70	K05	30
825	20	K01	
	80	K13	
1105	60	K09	40
1106	20	K08	80
1107	40	K08	60
1211	70	K07	30
1213	70	K07	
	30	K08	
1214	70	K08	30
1315	60	K06	40
1316	50	K06	
	50	K08	
1318	10	K06	90
1320	60	K08	40

TABLE 3-205 (Continued)
THE PROPORTION OF EACH ADF&G WILDLIFE ANALYSIS AREA (WAA) IN GEOZONES

MHU	% of WAA in Geozones within National Forest Percent	Geozone	% of WAA within Non-National Forest Land
1527	50	K06	
	50	K11	
1529	90	K06	
	10	K11	
1605	70	S08	
	30	S12	
2014	40	S01	
	40	S02	
	20	S11	
2515	80	C21	
	20	C23	
2517	28	C21	42
	30	C23	
2519	10	C21	
	90	C23	
2722	50	C21	50
2825	90	C14	
	10	C25	
2926	70	C25	30
3309	30	C05	
	70	C06	
3310	90	C05	
	10	C12	
3311	90	C05	
	10	C12	
3312	30	C09	
	70	C10	
3417	10	C03	
	90	C12	
3418	30	C01	
	70	C03	
3419	90	C01	
	10	C03	
3521	30	C01	
	70	C07	
3522	90	C02	10
3523	80	C02	20
3524	50	C02	50
3632	30	C04	70
4042	80	C15	20
4044	70	C15	30
4503	10	C17	6
	60	C22	
	24	C24	
4504			100
4505	60	C17	
	40	C22	
5132	50	S03	50
5133	30	S03	
	70	S10	

TABLE 3-206

1987 AND 1988 DEER HARVEST (# OF ANIMALS KILLED) WITHIN EACH GEOZONE

Chatham Area			Ketchikan Area			Stikine Area		
Geozone	1987 Harvest	1988 Harvest	Geozone	1987 Harvest	1988 Harvest	Geozone	1987 Harvest	1988 Harvest
C01	421	347	K01	0	0	S01	0	0
C02	1,769	1,247	K02	0	25	S02	0	25
C03	140	92	K04	243	359	S03	0	6
C04	241	219	K05	231	154	S04	5	0
C05	726	590	K06	2,253	1,652	S05	9	11
C06	1,092	746	K07	116	88	S06	18	12
C07	82	74	K08	310	207	S07	24	42
C09	593	807	K09	51	40	S08	16	29
C10	3,310	3,279	K10	6	11	S09	0	12
C11	108	87	K11	512	365	S10	0	0
C12	593	449	K12	16	0	S11	0	0
C13	299	262	K13	46	13	S12	16	35
C14	0	13	K14	5	0	S13	0	0
C15	2,888	2,516	K15	6	16	S14	73	158
C16	0	0						
C17	0	0						
C18	8	6						
C20	876	676						
C21	287	225						
C22	0	0						
C23	5	22						
C24	0	0						
C25	2	6						
	1987	1988						
			FOREST TOTAL	17,396	14,898			

Table 3-207 provides an analysis of the existing winter deer habitat capability with a finite rate of population increase of 1.1 (10 percent), and deer harvests for 1987 and 1988. During 1987 and 1988, nine geozones had deer harvests considerably higher than the 10 percent rate recommended by Flynn (1989). These nine geozones are C01, C02, C04, C05, C07, C09, C10, C20, and C21. Four of these geozones are located on Chichagof Island, one on Pleasant Island, two include Baranof and Kruzof Islands, one is the Mansfield Peninsula on Admiralty Island, and one includes the islands and mainland around Juneau. Deer harvests in each of these areas have increased from 1980 to 1988. For these areas to have supported these increasing harvest rates while maintaining current populations, the finite rate of population increase during the 1980's would need to be higher than 1.1 (10 percent) perhaps approaching the rate of 1.24 (24 percent) described by Flynn (1989). If these nine geozones are to maintain 1987-1988 harvest rates, deer populations would need to be at or above the winter habitat capabilities and the finite rate of population increase would need to be higher than the 10 percent level described by Flynn (1989). If this is not the case, the present harvest rates will result in population declines and future harvests will decline, even if the winter habitat capability remains the same.

For the other 42 geozones, the 1987 and 1988 harvest rates are either at a 10 percent harvest rate (geozones C06, C12, C13) or are below a 10 percent harvest rate (the remaining geozones).

Excluding the nine to 12 geozones with currently high harvest rates, the remaining geozones have harvest rates below their potential. This could be due to a variety of factors including: wolf predation, lack of people to harvest deer, lack of access or dangerous access routes, antlered-only harvest regulations designed to reduce harvest rates and allow deer populations to grow, closed hunting seasons in some areas designed to allow deer populations to grow, other factors which reduce the ability of a deer population to increase following harsh winters.

TABLE 3-207

RELATIONSHIP OF EXISTING WINTER HABITAT CAPABILITY, A FINITE RATE OF POPULATION INCREASE OF 1.1, AND DEER HARVEST STATISTICS FOR THE YEARS 1987 AND 1988.

GEOZONE	Winter Habitat Capability (# animals)	1.1 Finite Population Increase (# animals)	Range in Deer Harvest for 1987 and 1988 (# animals killed)		Percent of the Population killed during 1987 & 1988	
			Low	High	Low	High
C01	2,644	2,908	347	421	12	14
C02	9,631	10,594	1,247	1,769	12	17
C03	2,051	2,256	92	140	4	6
C04	1,202	1,322	219	241	17	18
C05	1,670	1,837	590	726	32	40
C06	8,239	9,063	746	1,092	8	12
C07	363	399	74	82	19	21
C09	3,863	4,249	593	807	14	19
C10	12,631	13,894	3,279	3,310	24	24
C11	1,789	1,968	87	108	4	5
C12	5,475	6,023	449	593	7	10
C13	2,424	2,666	262	299	10	11
C14	0	0	0	13	-	-
C15	30,721	33,793	2,516	2,888	7	9
C16	0	0	0	0	-	0
C17	0	0	0	0	-	0
C18	356	392	6	8	2	2
C20	3,028	3,331	676	876	20	26
C21	1,746	1,921	225	287	12	15
C22	0	0	0	0	-	-
C23	516	568	5	22	1	4
C24	0	0	0	0	-	-
C25	860	946	2	6	0	1
K01	0	0	0	0	-	-
K02	2,887	3,176	0	25	-	1
K04	12,791	14,070	243	359	2	3
K05	6,142	6,756	154	231	2	3
K06	27,578	30,336	1,652	2,253	5	7
K07	13,774	15,151	88	116	1	1
K08	15,437	16,981	207	310	1	2
K09	10,852	11,937	40	51	0	0
K10	8,260	9,086	6	11	0	0
K11	17,339	19,073	365	512	2	3
K12	788	867	0	16	0	2
K13	11,675	12,843	13	46	0	0
K14	5,023	5,525	0	5	0	0
K15	3,333	3,666	6	16	0	0
S01	13,279	14,607	0	0	0	0
S02	10,533	11,586	0	0	0	0
S03	5,906	6,497	0	6	0	0
S04	2,952	3,247	0	5	0	0
S05	2,837	3,121	9	11	0	0
S06	8,561	9,417	12	18	0	0
S07	2,682	2,950	24	42	1	1
S08	3,991	4,390	16	29	0	1
S09	3,260	3,586	0	12	0	0
S10	9,185	10,103	0	0	0	0
S11	3,678	4,046	0	0	0	0
S12	2,122	2,334	16	35	1	1
S13	425	468	0	0	0	0
S14	2,249	2,474	73	158	3	6
Totals	296,748	326,423	14,339	17,955		

MOUNTAIN GOAT

Table 3-208 displays the number of mountain goats harvested within Alaska Department of Fish and Game "Game Management Units" and "Minor Harvest Units," between 1980 and 1987. Only units which contain National Forest land are displayed in the table. The annual mountain goat harvest has ranged from a high of 239 for 1981 and 1982 to a low of 140 in 1987. For the 1980 through 1987 period, 30 percent of the harvest came from Game Management Unit 1A, 28 percent from Unit 4, 18 percent from Unit 1C, 15 percent from 1B, 5 percent from Unit 5A, and 3 percent from Unit 1D.

Tables 3-209 and 3-210 display the number of mountain goat hunters and hunter-days for the Game Management Units and the Minor Harvest Units. Only units which contain National Forest land are displayed in the table. The annual number of hunters has ranged from 463 to 677, and the number of hunter-days from 1,335 to 1,848. For the 1980 through 1987 period, the percent of hunters and hunter-days occurring within each Game Management Unit are as follows: 31 percent of the hunters and 28 percent of the hunter-days in Unit 4, 23 percent and 27 percent in Unit 1A, 16 percent and 15 percent in Unit 1C, 14 percent and 13 percent in Unit 1B, 11 percent and 10 percent in 1D, 5 percent and 7 percent in 5.

TABLE 3-208

ANNUAL MOUNTAIN GOAT HARVEST BY SPORT AND SUBSISTENCE HUNTERS BY ADF&G MINOR HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

Game Management Unit 1A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
612	-	-	-	1	-	-	-	-
613	-	-	-	-	-	-	-	1
614	-	-	-	2	1	-	1	1
700	8	-	-	-	-	-	-	-
715	11	13	19	12	5	8	5	8
716	3	4	4	1	3	2	2	-
717	12	19	15	11	16	10	10	[illegible]
718	-	-	-	-	-	2	-	-
719	1	23	27	23	18	19	28	7
819	11	-	-	-	-	-	-	-
820	2	3	-	3	2	2	-	1
821	-	1	3	2	-	2	1	-
822	9	5	4	8	5	5	2	[illegible]
823	1	-	4	2	1	1	-	2
824	-	-	1	-	-	-	2	-
826	1	-	-	1	2	-	-	-
Unknown	-	1	-	-	-	-	-	-
Total 1A	59	69	77	66	53	51	51	28

Game Management Unit 1B

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
1602	-	1	2	1	-	-	-	-
1603	-	3	7	5	9	3	2	2
1605	-	4	-	-	2	3	-	4
1706	-	14	2	10	4	6	6	-
1707	-	1	5	2	4	-	-	2
1708	-	7	4	7	7	5	9	12
1811	-	-	-	1	2	2	1	2
1812	-	-	2	-	1	1	1	5
1813	-	5	-	-	4	-	7	5
1814	-	-	-	1	1	-	3	-
1815	-	-	-	-	-	8	10	4
1816	-	-	-	-	-	2	-	2
1817	-	-	-	-	6	2	2	-
Total 1B		35	22	27	40	32	41	38

Game Management Unit 1C

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	5	-	-	-	-	-	-	1
2202	-	-	-	-	-	-	-	1
2203	-	-	1	-	-	-	3	-
2304	-	-	-	-	-	-	-	1
2305	-	-	-	-	1	-	-	-
2306	-	-	1	1	1	-	-	-
2408	-	-	-	4	2	-	-	[illegible]
2409	-	-	4	3	1	-	1	1
2410	-	-	-	1	-	-	2	[illegible]
2411	1	-	1	-	-	-	-	5
2412	-	-	2	-	-	-	-	-
2413	-	1	-	-	3	-	-	5
2514	1	2	-	-	-	-	5	-

TABLE 3xx.

ANNUAL MOUNTAIN GOAT HARVEST BY SPORT AND SUBSISTENCE HUNTERS BY MINOR HARVEST UNITS (Continued)

Game Management Unit 1C (Continued)

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
2515	2	2	3	-	-	-	-	-
2517	5	4	6	-	-	-	-	-
2518	1	-	-	3	3	1	6	2
2823	-	1	2	-	-	-	-	-
2824	11	16	10	15	13	26	17	7
2825	1	4	13	14	5	6	[illegible]	5
2926	-	-	-	-	-	-	1	-
2927	1	1	-	1	-	2	3	2
Total 1C	**28**	**31**	**43**	**42**	**29**	**35**	**42**	**31**

Game Management Unit 1D

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown 1/	1	9	2	2	-	-	1	-
4407	2	-	8	7	3	1	5	5
4408	-	-	-	-	2	-	1	
Total 1D	**3**	**9**	**10**	**9**	**5**	**1**	**7**	**5**

Game Management Unit 4

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	-	-	1	-	-	-	-	-
3001	27	35	40	30	26	28	26	17
3002	1	-	-	1	1	-	2	-
3003	16	30	18	16	10	8	16	16
3013	-	-	-	1	-	-	-	-
3207	-	-	1	-	2	1	2	-
3313	-	-	1	-	5	-	1	-
3315	2	2	4	1	1	1	-	1
3731	2	7	5	7	1	1	-	-
3733	1	1	4	4	3	2	3	2
Total 4	**49**	**75**	**74**	**60**	**49**	**41**	**50**	**36**

Game Management Unit 5A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
4503	5	9	8	14	3	4	2	2
4504	-	1	-	-	-	1	3	-
4505	-	8	5	-	-	-	-	-
4607	-	2	-	3	1	2	-	-
Total	**5**	**20**	**13**	**17**	**4**	**7**	**5**	**2**
Grand Total	**144**	**239**	**239**	**221**	**180**	**167**	**196**	**140**

Source: Alaska Department of Fish and Game, letter dated August 18, 1988.

1/ Some of the unknown mountain goat harvest in Unit 1D may be from non-National Forest lands.

2/ Years without any data (designated by a -) reflect no recorded information.

TABLE 3-209

ANNUAL NUMBERS OF MOUNTAIN GOAT HUNTERS BY ADF&G MINOR HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

Game Management Unit 1A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
405	-	-	-	-	-	-	-	1
612	-	-	-	4	-	-	-	-
613	-	-	-	1	2	2	3	3
614	-	-	3	2	1	2	1	1
700	16	-	-	-	-	-	-	-
715	29	36	40	29	26	20	10	[illegible]
716	4	11	11	5	8	6	8	-
717	25	33	25	18	27	22	22	7
718	-	-	-	-	-	3	-	-
719	1	39	56	56	56	45	62	28
819	33	-	-	-	-	-	-	-
820	5	7	1	6	2	7	4	4
821	1	2	4	3	1	6	4	2
822	12	14	8	14	9	21	3	11
823	1	1	4	7	1	1	1	2
824	-	-	2	-	-	-	3	-
826	1	1	-	2	4	-	-	-
Unknown	-	2	-	-	4	2	1	3
Total 1A	**128**	**146**	**154**	**147**	**141**	**137**	**122**	**88**

Game Management Unit 1B

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
1601	-	1	2	-	-	-	-	-
1602	-	1	5	2	1	-	-	-
1603	-	7	18	12	19	12	21	16
1605	-	9	8	8	6	5	-	13
1706	-	33	23	44	26	55	52	-
1707	-	8	11	8	6	-	4	9
1708	-	10	11	9	10	11	14	19
1810	-	-	-	1	-	1	-	-
1811	-	2	2	2	3	12	5	3
1812	-	3	2	5	-	1	2	7
1813	-	10	-	1	-	-	10	8
1814	-	-	-	1	-	-	4	-
1815	-	-	-	-	-	9	12	4
1816	-	-	-	-	-	2	-	2
1817	-	1	-	-	-	2	3	2
Total 1B		**85**	**82**	**93**	**71**	**110**	**127**	**83**

Game Management Unit 1C

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	9	8	5	5	1	5	-	67
2202	2	-	-	-	-	-	-	1
2203	-	-	1	2	-	-	5	-
2304	-	1	-	-	-	-	-	1
2305	-	1	4	-	1	1	-	-
2306	1	1	2	7	2	1	-	-
2408	-	-	-	4	2	-	-	1
2409	1	8	10	4	5	2	2	1
2410	-	1	-	1	-	-	2	1
2411	3	-	1	-	-	-	-	5

TABLE 3-209

ANNUAL NUMBERS OF MOUNTAIN GOAT HUNTERS BY ADF&G MINOR HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST (CONTINUED)

Game Management Unit 1C

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
2412	-	-	2	-	1	-	2	-
2413	-	3	0	0	5	2	-	2
2514	3	6	5	4	11	10	11	-
2515	9	12	13	-	-	2	3	-
2517	21	15	20	-	-	-	-	-
2518	2	1	-	4	8	6	11	2
2519	1	-	1	-	-	-	-	-
2800	-	-	-	-	-	2	-	-
2823	2	4	6	-	-	-	-	-
2824	16	24	28	31	36	33	32	7
2825	12	4	15	31	8	16	5	5
2926	2	-	3	4	1	-	2	2
2927	2	1	1	4	1	3	8	2
Total 1C	86	90	117	101	82	83	83	98

Game Management Unit 1D

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown 1/	75	82	26	23	85	72	53	34
4407	2	1	14	14	3	1	5	5
4408	-	-	1	-	2	-	1	-
Total 1D	77	83	41	37	90	73	59	39

Game Management Unit 4

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	5	1	6	-	10	1	2	6
3000	-	-	-	123	-	-	-	-
3001	64	101	96	37	64	67	66	62
3002	5	7	10	2	2	1	7	8
3003	63	96	102	25	51	52	55	46
3013	-	-	-	1	-	-	-	-
3031	-	1	-	-	-	-	-	1
3100	-	1	-	-	-	-	-	-
3200	-	-	-	5	-	-	-	-
3206	2	1	-	-	-	1	-	-
3207	5	3	3	1	5	9	2	3
3300	1	-	1	1	-	-	-	-
3313	-	-	2	-	8	3	1	1
3315	2	2	4	1	1	4	-	1
3700	-	-	-	11	-	-	-	-
3731	3	9	14	7	9	2	-	-
3733	6	3	7	4	6	7	9	9
Total 4	156	225	245	218	156	147	142	137

TABLE 3-209

ANNUAL NUMBERS OF MOUNTAIN GOAT HUNTERS BY ADF&G MINOR HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST (CONTINUED)

Game Management Unit 5A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	1	2	3	1	20	5	-	4
4503	17	25	24	27	4	15	8	13
4504	-	1	1	-	-	1	3	1
4505	4	14	10	1	-	-	-	-
4607	3	5	-	4	1	2	-	-
Total 5A	25	47	38	33	25	23	11	18
Grand Total	472	676	677	629	565	573	544	463

Source: Alaska Department of Fish and Game, letter dated August 18, 1988.

1/ Some of the unknown mountain goat harvest in Unit 1D may be from non-National Forest lands.

2/ Years without any data (designated by a -) reflect no recorded information.

TABLE 3-210

ANNUAL MOUNTAIN GOAT HUNTER-DAYS BY SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST 1/

Game Management Unit 1A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
405	-	-	-	-	-	-	-	3
612	-	-	-	13	-	-	-	-
613	-	-	-	4	6	4	7	6
614	-	-	6	6	2	9	2	9
700	45	-	-	-	-	-	-	-
715	88	115	119	96	91	42	25	95
716	10	39	26	14	31	21	38	-
717	60	100	85	62	93	72	88	41
718	-	-	-	-	-	10	-	-
719	3	124	159	175	187	161	176	81
819	93	-	-	-	-	-	-	-
820	11	18	2	15	5	32	10	9
821	3	5	18	16	3	22	12	12
822	31	35	18	45	21	65	4	43
823	3	2	7	17	3	2	3	6
824	-	-	5	-	-	-	7	-
826	1	2	-	6	19	-	-	-
Unknown	-	13	-	-	14	5	2	6
Total 1A	348	453	445	469	475	445	374	311

Game Management Unit 1B

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
1601	-	-	2	-	-	-	-	-
1602	-	6	12	5	3	-	-	-
1603	-	28	38	29	63	39	50	47
1605	-	18	14	28	8	8	-	23
1706	-	83	40	88	59	110	103	-
1707	-	18	14	20	11	-	8	18
1708	-	40	25	24	23	42	42	73
1810	-	-	-	2	-	1	-	-

TABLE 3-210
ANNUAL MOUNTAIN GOAT HUNTER-DAYS BY SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST (CONTINUED)

Game Management Unit 1B

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
1811	-	6	6	3	6	41	10	-
1812	0	4	2	12	-	3	4	28
1813	-	29	-	4	-	0	28	[illegible]
1814	-	-	-	3	-	-	13	-
1815	-	-	-	-	-	24	41	[illegible]
1816	-	-	-	-	-	11	-	[illegible]
1817	-	2	-	-	-	4	3	[illegible]
Total 1B		**234**	**153**	**218**	**173**	**283**	**302**	**231**

Game Management Unit 1C

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	36	16	10	10	2	9	-	150
2202	3	-	-	-	-	-	-	5
2203	-	-	2	6	-	-	22	-
2304	-	6	-	-	-	-	-	2
2305	-	6	14	-	2	1	-	-
2306	2	6	4	28	7	2	-	-
2408	-	-	-	11	2	-	-	3
2409	1	13	29	12	7	7	4	3
2410	-	2	-	2	-	-	6	3
2411	7	-	3	-	-	-	-	7
2412	-	-	6	-	1	-	8	2
2413	-	9	-	-	13	6	-	8
2514	6	13	13	4	27	30	36	-
2515	13	22	23	-	-	4	5	-
2517	39	21	47	-	-	-	-	-
2518	5	3	-	12	25	7	29	3
2519	2	-	2	-	-	-	-	-
2800	-	-	-	-	-	11	-	-
2823	7	9	25	-	-	-	-	-
2824	52	61	68	78	98	59	72	19
2825	46	16	41	125	27	48	18	10
2926	4	-	8	12	4	-	4	6
2927	14	7	4	26	3	10	21	5
Total 1C	**237**	**210**	**299**	**326**	**218**	**194**	**225**	**226**

Game Management Unit 1D

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown 2/	299	228	53	38	196	155	103	96
4407	5	1	22	35	3	2	6	15
4408	-	-	1	-	11	-	8	-
Total 1D	**304**	**229**	**76**	**73**	**210**	**157**	**117**	**111**

TABLE 3-210

ANNUAL MOUNTAIN GOAT HUNTER-DAYS BY SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST (CONTINUED)

Game Management Unit 4

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	13	1	19	-	27	5	2	12
3000	-	-	-	290	-	-	-	-
3001	167	273	261	80	168	216	143	168
3002	9	14	19	3	5	4	11	18
3003	152	222	265	53	130	98	117	107
3013	-	-	-	1	-	-	-	-
3031	-	1	-	-	-	-	-	7
3100	-	1	-	-	-	-	-	-
3200	-	-	-	21	-	-	-	-
3206	5	4	-	-	-	3	-	-
3207	13	3	6	2	11	38	8	5
3300	4	-	4	1	-	-	-	-
3313	-	-	3	-	16	5	3	5
3315	3	4	13	1	1	8	-	3
3700	-	-	-	25	-	-	-	-
3731	16	22	63	14	13	3	-	-
3733	19	17	24	7	7	11	25	33
Total 4	401	562	677	498	378	391	309	358

Game Management Unit 5A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	6	8	7	1	64	28	-	17
4503	86	94	96	75	12	34	30	80
4504	-	6	10	-	-	4	10	1
4505	25	38	27	4	-	-	-	-
4607	20	14	-	17	2	6	-	-
Total	137	160	140	97	78	72	40	98
Grand Total	1,427	1,848	1,790	1,681	1,532	1,542	1,367	1,335

Source: Alaska Department of Fish and Game, letter dated August 18, 1988.

1/ Some of the unknown mountain goat harvest in Unit 1D may be from non-National Forest lands.

2/ Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter day is equal to one person hunting for any length of time during a 24-hour period. A person hunting for one hour is the equivalent of one hunter day, and a person hunting for 8 hours is equivalent to one hunter day.

3/Years without any data (designated by a -) reflect no recorded information.

BROWN BEAR

Table 3-211 displays the number of brown bears harvested within Alaska Department of Fish and Game "Game Management Units" and "Minor Harvest Units" between [illegible] and 1987. Only units which contain National Forest land are displayed in the table. The annual brown bear harvest has ranged from a low of 88 in 1980 to a high of 151 in 1987. A total of 900 brown bears were harvested from 1980 to 1987. Between 1980 and 1987, 73 percent of the harvest came from Game Management Unit 4, 17 percent from Unit 5A, four percent from Unit 1C, three percent from 1B, two percent from Unit 1A.

Within Game Management Unit 4, the 1980 through 1987 brown bear harvest was distributed as follows: 41 percent occurred on Chichagof or adjacent islands, [illegible] percent on Admiralty or adjacent islands, and 16 percent on Baranof or adjacent islands.

Alaska Department of Fish and Game only collects data on the number of "successful" brown bear hunters. The number of successful brown bear hunters is the same as the number of brown bear harvested, displayed in Table 3-211. The number of brown bear hunter-days is displayed in Table 3-212 and is the number of hunter-days for successful hunters. No data is available for unsuccessful hunters. Between 1980 and 1987, the annual number of successful brown bear hunter-days has ranged from 391 in 1981 to 625 in 1987. From 1980 through 1987, 72 percent of the hunter-days occurred in Game Management Unit 4, 21 percent in Unit 5A, three percent in Unit 1B, and two percent in each of Units 1A and 1C.

TABLE 3-211

ANNUAL BROWN BEAR HARVEST (# OF ANIMALS KILLED) BY SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST 1/

Game Management Unit 1A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
715	-	-	-	1	-	-	-	2
716	-	1	1	5	2	1	1	-
717	-	-	-	-	1	-	1	2
820	-	-	-	1	-	-	-	-
822	1	-	-	-	-	-	-	1
823	-	-	1	-	-	-	-	-
Total	1	1	2	7	3	1	2	5

Game Management Unit 1B

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	1	-	-	-	-	-	-	-
1708	-	1	-	-	-	2	2	1
1811	-	1	2	1	-	-	-	1
1812	1	-	-	-	1	2	-	-
1813	-	2	1	-	3	-	1	-
1814	1	1	-	1	-	-	2	-
1815	-	-	-	-	-	1	-	-
1817	-	-	-	-	-	-	-	2
Total	3	5	3	2	4	5	5	4

Game Management Unit 1C

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
2202	-	-	-	-	-	-	1	-
2203	-	-	-	-	-	-	2	-
2408	-	-	-	-	-	1	-	-
2409	-	-	1	1	-	1	-	1
2410	-	-	-	-	-	2	-	-
2411	1	-	1	-	1	-	-	1
2514	1	-	1	-	1	-	1	-
2515	-	-	-	-	1	-	-	-
2518	-	-	-	1	1	-	-	1
2823	1	1	1	2	1	2	2	-
2825	-	-	2	-	-	-	-	-
Total 1C	3	1	6	4	5	6	6	3

Game Management Unit 1D

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown 1/	-	-	-	-	1	-	-	-
4408	-	1	-	-	-	-	-	-
Total 1D	-	1	-	-	1	-	-	-

Game Management Unit 3

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
1903	-	-	-	2	-	-	-	-
Total 3	-	-	-	2	-	-	-	-

TABLE 3-211
ANNUAL BROWN BEAR HARVEST (# OF ANIMALS KILLED) BY SPORT AND SUBSISTENCE HUNTERS IN ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST (CONTINUED)

Game Management Unit 4

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
3001	4	-	1	3	4	2	-	5
3003	5	2	3	-	2	1	-	1
3104	1	1	-	-	-	-	1	1
3105	-	-	-	-	1	-	1	-
3206	1	-	-	-	1	-	-	-
3207	-	-	-	-	1	2	-	-
3312	-	-	2	-	-	-	-	-
3313	3	-	-	3	6	3	2	3
3315	1	-	-	-	2	3	1	2
3731	3	4	1	2	3	7	2	4
3733	2	3	2	5	4	2	2	7
3734	1	-	3	2	2	1	3	2
South Baranof and adj islands	**21**	**10**	**12**	**15**	**26**	**21**	**12**	**25**

Game Management Unit 4

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
3308	1	5	4	4	4	2	4	4
3309	-	-	1	2	-	2	3	-
3310	1	1	1	1	-	-	-	2
3311	2	2	1	3	4	1	3	2
3400	-	1	-	-	1	-	-	-
3416	3	1	2	3	1	4	6	3
3417	3	2	-	1	3	4	5	3
3418	-	-	-	-	-	-	2	-
3419	-	-	-	-	-	2	2	-
3420	-	-	1	1	2	-	1	2
3500	1	-	-	-	-	-	-	-
3522	4	1	1	2	2	4	-	-
3523	2	4	6	5	2	10	4	8
3524	2	2	-	1	1	4	5	5
3600	1	-	2	-	3	-	-	-
3625	3	2	-	-	3	-	4	8
3626	1	-	-	-	-	2	-	2
3627	1	-	-	1	-	1	-	1
3628	-	-	1	-	2	-	-	-
3629	1	4	2	3	6	1	7	3
3630	-	-	-	-	1	3	4	-
Total Chichagof and adjacent islands	**26**	**25**	**22**	**27**	**35**	**40**	**50**	**43**

TABLE 3-211
ANNUAL BROWN BEAR HARVEST (# OF ANIMALS KILLED) BY SPORT AND SUBSISTENCE HUNTERS IN ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST (CONTINUED)

Game Management Unit 4

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
3835	-	-	-	2	2	-	2	1
3836	1	1	2	1	2	2	-	7
3938	3	1	1	5	12	8	1	4
3939	3	1	4	6	5	2	5	8
3940	2	3	3	6	6	1	4	7
4041	-	12	5	9	13	7	12	10
4042	-	-	1	1	3	-	-	-
4043	-	-	-	1	-	-	-	1
4044	-	1	-	1	1	-	3	1
4145	2	-	1	1	1	1	3	-
4146	-	2	-	4	1	-	-	1
4147	5	-	-	-	-	1	1	3
4148	2	4	-	1	2	4	2	1
Admiralty Island	**18**	**25**	**17**	**38**	**48**	**26**	**33**	**44**
Total GMU 4	**65**	**60**	**51**	**80**	**109**	**87**	**95**	**112**

Game Management Unit 5A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
4503	10	12	16	17	13	14	13	24
4504	-	1	1	-	-	1	-	-
4505	6	3	3	6	3	-	2	3
4505	-	-	-	-	1	-	-	-
4607	-	-	-	1	-	-	-	-
Total 5A	**16**	**16**	**20**	**24**	**17**	**15**	**15**	**27**
Grand Total	**88**	**84**	**82**	**119**	**139**	**114**	**123**	**151**

Source: Alaska Department of Fish and Game, letter dated June 21, 1988.

1/ Brown bear kills not attributed to legal sport and subsistence hunting are not included in this table.

2/ Years without any data (designated by a -) reflect no recorded information.

TABLE 3-212

ANNUAL BROWN BEAR HUNTER-DAYS OF SUCCESSFUL SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST 1/

Game Management Unit 1A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
715	-	-	-	1	-	-	-	[illegible]
716	-	7	7	18	7	6	10	-
717	-	-	-	-	3	-	3	[illegible]
820	-	-	-	10	-	-	-	-
822	1	-	-	-	-	-	-	3
823	-	-	1	-	-	-	-	[illegible]
Total 1A	1	7	8	29	10	6	13	12

Game Management Unit 1B

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	3	-	-	-	-	-	-	-
1708	-	3	-	-	-	29	11	1
1811	-	4	3	6	-	-	-	4
1812	5	-	-	-	1	7	-	-
1813	-	1	3	-	16	-	6	-
1814	4	1	-	3	-	-	10	-
1815	-	-	-	-	-	3	-	-
1817	-	-	-	-	-	-	-	2
Total 1B	12	9	6	9	17	39	27	7

Game Management Unit 1C

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
2202	-	-	-	-	-	-	1	-
2203	-	-	-	-	-	-	6	-
2408	-	-	-	-	-	1	-	-
2409	-	-	2	4	-	1	-	3
2410	-	-	-	-	-	6	-	-
2411	1	-	3	-	2	-	-	3
2514	1	-	1	-	1	-	1	-
2515	-	-	-	-	1	-	-	-
2518	-	-	-	2	4	-	-	1
2823	2	2	7	5	3	7	4	-
2825	-	-	9	-	-	-	-	-
Total 1C	4	2	22	11	11	15	12	7

Game Management Unit 1D

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	-	-	-	-	10	-	-	-
4408	-	2	-	-	-	-	-	-
Total 1D	-	2	-	-	10	-	-	-

Game Management Unit 3

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
1903	-	-	-	6	-	-	-	-
Total 3	-	-	-	6	-	-	-	-

TABLE 3-212 (Continued)

ANNUAL BROWN BEAR HUNTER-DAYS OF SUCCESSFUL SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST 1/

Game Management Unit 4

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
3001	16	-	8	5	18	3	-	7
3003	8	4	4	-	11	2	-	1
3104	2	4	-	-	-	-	2	[illegible]
3105	-	-	-	-	1	-	5	-
3206	1	-	-	-	1	-	-	-
3207	-	-	-	-	1	10	-	-
3312	-	-	9	-	-	-	-	-
3313	7	-	-	21	12	18	14	9
3315	10	-	-	-	11	15	3	5
3731	12	15	6	8	12	30	12	26
3733	13	16	12	7	25	6	10	30
3734	2	-	19	4	7	6	20	4
Baranof & Adj. Islands	**71**	**39**	**58**	**45**	**99**	**90**	**66**	**85**

Game Management Unit 4

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
3308	5	16	14	26	17	9	14	19
3309	-	-	3	3	-	5	14	-
3310	8	3	1	2	-	-	-	3
3311	14	7	6	7	22	2	3	8
3400	-	4	-	-	1	-	-	-
3416	20	2	9	28	2	15	42	18
3417	28	7	-	1	14	26	38	14
3418	-	-	-	-	-	-	9	-
3419	-	-	-	-	-	12	6	-
3420	-	-	1	8	3	-	4	4
3500	5	-	-	-	-	-	-	-
3522	15	1	8	4	9	11	-	-
3523	11	22	56	34	15	20	25	31
3524	14	3	-	11	6	20	20	16
3600	7	-	10	-	17	-	-	-
3625	14	14	-	-	20	-	15	50
3626	7	-	-	-	-	12	-	6
3627	1	-	-	5	-	8	-	5
3628	-	-	4	-	4	-	-	-
3629	4	24	12	11	26	5	19	5
3630	-	-	-	-	4	10	13	-
Chichagof & Adj. Islands	**153**	**103**	**124**	**140**	**160**	**155**	**222**	**179**

TABLE 3-212 (Continued)

ANNUAL BROWN BEAR HUNTER-DAYS OF SUCCESSFUL SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST 1/

Game Management Unit 4

Minor Harvest Units	1980	1981	1982	1983	1984	1985	[illegible]	[illegible]
3835	-	-	-	4	2	-	2	1
3836	2	1	9	2	8	12	-	21
3938	18	4	4	33	61	18	1	[illegible]
3939	14	9	19	25	23	9	22	[illegible]
3940	14	18	9	34	17	5	23	[illegible]
4041	-	69	28	56	67	[illegible]	[illegible]	[illegible]
4042	-	-	7	2	21	-	-	-
4043	-	-	-	1	-	-	-	1
4044	-	1	-	1	2	-	5	1
4145	7	-	2	1	2	3	6	-
4146	-	13	-	12	6	-	-	3
4147	38	-	-	-	-	1	3	14
4148	20	32	-	4	11	36	6	2
Admiralty Island	113	147	78	175	220	130	131	194
Total 4	337	289	260	360	479	375	419	458

Game Management Unit 5

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
4503	49	46	71	115	76	85	87	121
4504	-	6	10	-	-	7	-	-
4505	49	30	26	37	13	-	11	20
4506	-	-	-	-	6	-	-	-
4607	-	-	-	7	-	-	-	-
Total 5	98	82	107	159	95	92	98	141
Grand Total	452	391	403	574	622	527	569	625

Source: ADF&G letter, dated June 21, 1988.

1/ Hunter-days are compiled by the Alaska Department of Fish and Game: one hunter-day is equivalent to one person hunting for any length of time during a 24-hour period. Brown bear hunter day information is only collected for successful hunters; the number of hunter-days for unsuccessful hunters is unknown.

2/ Years without any data (designated by a -) reflect no recorded information.

BLACK BEAR

Table 3-213 displays the number of black bears harvested within Alaska Department of Fish and Game "Game Management Units" and "Minor Harvest Units," for the period 1980 through 1987. Only units which contain National Forest land are displayed in the table. A total of 2,891 black bears were harvested from 1980 through 1987. The annual black bear harvest has ranged from a low of 225 in 1981 to a high of 510 in 1987. For the 1980 through 1987 period, 31 percent of the harvest came from Game Management Unit 2, 27 percent from Unit 3, 19 percent from Unit 1C, 12 percent from 1A, six percent from Unit 5A, four percent from Unit 1B.

The Alaska Department of Fish and Game only collects data on the number of "successful" black bear hunters. The number of successful black bear hunters is the same as the number of black bear harvested, displayed in Table 3-213. The number of black bear hunter-days is displayed in Table 3-214, and is the number of hunter-days for successful hunters. No data is available for unsuccessful hunters. For the 1980 through 1987 period, the annual number of successful black bear hunter-days has ranged from 772 in 1980 to 1,655 in 1987. From 1980 through 1987, 29 percent of the hunter-days occurred in Game Management Unit 3, 28 percent in Unit 2, 17 percent in Unit 1C, 12 percent in Unit 5A, 11 percent in Unit 01A, and three percent in Unit 1B.

TABLE 3-213

ANNUAL BLACK BEAR HARVEST (# OF ANIMALS KILLED) BY SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST 1/

Game Management Unit 1A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	-	-	-	-	-	-	1	-
101	-	1	2	1	1	1	1	-
404	2	-	6	7	3	2	6	9
405	-	-	-	3	-	3	2	-
406	2	4	6	10	11	19	20	19
407	1	1	1	6	4	1	2	5
408	3	-	-	1	3	1	-	-
509	-	1	-	1	1	2	-	1
510	1	4	5	7	12	9	9	11
612	-	1	2	-	-	-	-	1
613	1	-	1	-	-	4	1	1
715	1	-	-	2	1	2	2	1
716	-	1	-	1	1	5	2	4
717	2	-	1	-	1	-	2	1
719	2	6	3	2	4	-	5	1
820	5	3	3	2	-	-	-	-
822	6	4	6	4	-	2	12	7
823	-	-	2	-	1	-	-	-
824	1	-	-	-	-	-	-	-
826	-	-	-	-	2	-	-	-
Total 1A	**27**	**26**	**38**	**47**	**45**	**51**	**65**	**61**

Game Management Unit 1B

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
1601	1	-	-	1	2	-	4	3
1602	-	-	-	-	-	1	1	2
1603	3	1	2	7	4	5	6	3
1605	3	-	-	-	2	3	-	2
1706	-	-	1	1	1	2	-	2
1707	-	-	3	-	1	1	1	1
1708	-	-	1	-	3	1	3	1
1810	-	-	-	1	-	2	1	1
1811	-	-	1	1	1	6	-	5
1812	-	-	1	-	2	-	1	-
1813	2	-	-	-	-	1	1	1
1814	-	-	-	-	1	-	1	-
1817	1	-	-	1	-	-	-	-
Total 1B	**10**	**1**	**9**	**12**	**17**	**22**	**19**	**21**

Game Management Unit 1C

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	2	-	-	-	-	-	-	-
2001	-	-	-	-	1	-	-	-
2202	1	2	2	2	4	1	1	1
2203	-	1	3	-	4	-	1	1
2300	-	-	1	-	-	-	-	-
2304	3	4	11	9	9	15	12	14
2305	3	-	9	4	5	7	4	8

TABLE 3-213 (Continued)
ANNUAL BLACK BEAR HARVEST (# OF ANIMALS KILLED) BY SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST 1/

2306	3	-	1	4	9	13	6	8
2408	1	1	2	2	1	3	2	3
2409	-	1	3	4	2	4	2	4
2410	1	1	2	-	-	1	-	-
2514	5	1	2	2	11	6	1	8
2515	2	3	3	5	4	4	3	6
2517	5	3	13	7	5	8	12	3
2518	-	-	1	1	2	9	5	3
2519	-	2	3	-	1	1	-	1
2722	3	1	2	-	2	-	3	1
2823	3	5	6	6	9	12	3	8
2824	-	-	-	2	-	2	2	6
2825	1	2	-	1	2	2	1	2
2926	6	2	1	-	6	6	9	11
2927	2	10	7	1	4	4	6	18
Total 1C	41	39	72	50	81	98	73	106

Game Management Unit 1D

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	-	-	-	-	1	-	-	-
4407	1	1	-	-	-	-	3	-
4408	-	3	-	-	-	-	-	1
Total 1D	1	4	-	-	1	-	3	1

Game Management Unit 2

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	2	5	2	1	-	-	-	-
901	1	-	-	-	1	-	-	1
1105	1	1	-	2	1	-	1	2
1107	3	3	4	-	5	1	10	5
1108	4	-	-	1	3	-	1	1
1200	1	-	-	-	-	1	-	-
1209	-	-	1	-	1	-	-	-
1210	3	-	14	-	2	2	3	2
1211	-	-	8	-	-	4	4	2
1213	-	1	2	2	13	6	4	2
1214	7	4	2	4	12	14	14	7
1315	4	8	7	7	5	7	16	10
1316	1	-	-	6	3	3	6	-
1317	11	7	7	5	6	10	15	16
1318	7	10	8	8	14	8	26	32
1319	3	4	12	9	7	6	4	6
1420	9	7	1	5	6	2	5	5
1421	3	-	3	1	7	2	3	5
1422	14	11	16	15	11	13	24	19
1525	1	1	13	4	2	2	-	-
1526	2	-	1	-	2	1	-	2
1527	6	8	10	12	16	23	19	21
1528	-	-	1	2	3	2	-	2
1529	3	5	2	4	3	1	2	9
Total 2	86	75	114	88	123	108	157	152

TABLE 3-213 (Continued)

ANNUAL BLACK BEAR HARVEST (# OF ANIMALS KILLED) BY SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST 1

Game Management Unit 3

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
1901	-	-	-	2	1	1	1	3
1903	1	3	2	-	1	-	-	12
1904	-	1	1	-	-	-	-	-
1906	-	1	-	-	1	-	-	-
2000	2	1	1	-	2	-	-	-
2007	15	19	13	10	9	25	[illegible]	21
2008	1	-	1	-	-	-	1	1
2009	4	2	10	8	16	21	6	13
2010	7	11	7	11	7	5	8	11
2011	5	9	16	8	8	15	11	16
2012	4	10	5	22	23	16	16	18
2013	1	-	6	5	9	13	8	7
2014	1	8	22	16	13	26	49	51
Total 3	41	65	84	82	90	122	137	153

Game Management Unit 5A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	1	-	-	-	-	-	-	-
4503	13	10	21	10	11	21	9	9
4504	-	1	-	1	-	3	2	1
4505	5	1	5	6	2	5	4	2
4506	3	2	1	1	6	5	8	4
TOTAL 5A	**22**	**14**	**27**	**18**	**19**	**34**	**23**	**16**
GRAND TOTAL	228	224	344	297	376	435	477	510

Source: Alaska Department of Fish and Game letter June 21, 1988.

1/ Black bear kills not attributed to legal sport and subsistence hunting are not included in this table.

2/ Years without any data (designated by a -) reflect no recorded information.

TABLE 3-214

ANNUAL BLACK BEAR HUNTER-DAYS BY SUCCESSFUL SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST 1/

Game Management Unit 1A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	-	-	-	-	-	-	12	-
101	-	3	2	1	1	7	1	-
404	17	-	16	34	6	8	16	25
405	-	-	-	6	-	6	5	-
406	22	7	8	55	47	68	44	61
407	2	3	2	9	4	1	2	5
408	5	-	-	1	10	5	-	-
509	-	1	-	1	1	7	-	1
510	2	10	16	15	20	12	15	18
612	-	1	3	-	-	-	-	1
613	1	-	1	-	-	13	2	1
715	3	-	-	17	3	4	4	3
716	-	3	-	5	3	34	6	20
717	7	-	6	-	1	-	6	4
719	12	15	3	2	6	-	6	3
820	11	7	6	4	-	-	-	-
822	20	22	23	9	-	4	33	16
823	-	-	10	-	7	-	-	-
824	1	-	-	-	-	-	-	-
826	-	-	-	-	12	-	-	-
Total 1A	103	72	96	159	121	169	152	158

Game Management Unit 1B

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
1601	3	-	-	2	7	-	7	4
1602	-	-	-	-	-	4	1	8
1603	7	2	4	8	7	8	21	10
1605	3	-	-	-	2	4	-	6
1706	-	-	4	2	4	4	-	3
1707	-	-	5	-	1	1	1	1
1708	-	-	1	-	5	2	6	1
1810	-	-	-	1	-	5	1	10
1811	-	-	3	3	1	7	-	5
1812	-	-	4	-	2	-	2	-
1813	2	-	-	-	-	2	6	3
1814	-	-	-	-	5	-	7	-
1817	3	-	-	1	-	-	-	-
Total 1B	18	2	21	17	34	37	52	51

Game Management Unit 1C

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
2001	-	-	-	-	2	-	-	-
2202	1	2	9	3	10	1	1	1
2203	-	1	3	-	8	-	4	5
2300	-	-	1	-	-	-	-	-
2304	13	19	19	26	17	40	38	34
2305	10	-	29	6	10	31	21	14
2306	3	-	2	12	18	32	12	25

TABLE 3-214

ANNUAL BLACK BEAR HUNTER-DAYS BY SUCCESSFUL SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST 1/ X

2408	1	1	5	4	3	3	3	[illegible]
2409	-	2	7	12	12	6	2	6
2410	2	3	6	-	-	3	-	-
2514	11	1	6	5	35	21	1	9
2515	6	46	3	5	12	14	5	104
2517	11	5	13	9	12	12	19	13
2518	-	-	1	1	7	27	7	4
2519	-	13	16	-	4	5	-	1
2722	3	2	2	-	3	-	3	1
2823	10	10	21	24	22	23	52	22
2824	-	-	-	2	-	2	3	19
2825	5	3	-	3	5	2	4	4
2926	30	10	3	-	11	9	14	39
2927	15	29	34	4	40	11	22	49
Total 1C	121	147	180	116	231	242	211	354

Game Management Unit 1D

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	-	-	-	-	1	-	-	-
4407	1	1	-	-	-	-	3	-
4408	-	7	-	-	-	-	-	1
Total 1D	1	8	-	-	1	-	3	1

Game Management Unit 2

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	10	22	4	3	-	-	-	-
901	1	-	-	-	3	-	-	1
1105	2	2	-	2	1	0	1	3
1107	4	6	17	-	15	4	22	13
1108	8	-	-	4	9	-	3	-
1200	5	-	-	-	-	1	-	-
1209	-	-	6	-	1	-	-	-
1210	23	-	39	-	4	4	17	2
1211	-	-	12	-	-	9	27	2
1213	-	4	8	4	22	5	18	2
1214	22	9	3	7	23	60	58	33
1315	8	25	10	11	11	25	71	37
1316	2	-	-	18	7	15	25	-
1317	35	17	13	10	13	18	35	47
1318	12	23	23	20	23	34	46	88
1319	9	11	21	37	14	15	8	20
1420	38	44	2	19	16	2	13	21
1421	18	-	8	7	29	2	38	18
1422	44	51	17	58	30	21	65	59
1525	3	1	38	4	4	2	-	-
1526	3	-	0	-	14	1	-	2
1527	12	8	17	47	43	81	71	54
1528	-	-	3	14	15	3	-	2
1529	5	24	10	8	5	6	11	36
Total 2	264	247	251	273	302	308	529	447

TABLE 3-214
ANNUAL BLACK BEAR HUNTER-DAYS BY SUCCESSFUL SPORT AND SUBSISTENCE HUNTERS BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST 1/ 2/

Game Management Unit 3

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
1901	-	-	-	11	1	2	2	3
1903	1	10	11	-	6	-	11	41
1904	-	1	1	-	-	-	-	-
1906	-	3	-	-	1	-	-	-
2000	12	-	6	-	9	-	-	-
2007	36	57	22	30	14	95	92	[illegible]
2008	1	-	3	-	-	-	1	-
2009	9	8	30	19	56	58	9	19
2010	17	34	25	30	23	20	30	17
2011	13	21	84	22	24	66	21	48
2012	17	27	11	67	52	64	45	64
2013	14	-	21	13	36	54	19	16
2014	7	40	69	58	88	110	236	211
Total 3	**127**	**201**	**283**	**250**	**310**	**469**	**466**	**542**

Game Management Unit 5A

Minor Harvest Units	1980	1981	1982	1983	1984	1985	1986	1987
Unknown	5	-	-	-	-	-	-	-
4503	79	59	113	47	59	131	64	54
4504	-	4	-	9	-	7	6	1
4505	37	8	37	29	20	28	27	11
4506	17	24	10	1	48	36	72	36
Total 5A	**138**	**95**	**160**	**86**	**127**	**202**	**169**	**102**
Grand Total	772	782	991	901	1,126	1,427	1,582	1,655

Source: ADF&G letter dated June 21, 1988.

1/ Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter-day is equal to one person hunting for any length of time during a 24-hour period. Black bear hunter day information is only collected for successful hunters; the number of hunter-days for unsuccessful hunters is unknown.

2/ Years without any data (designated by a -) reflect no recorded information.

MOOSE

The Alaska Department of Fish and Game is currently developing a strategic plan for management of moose in Southeast Alaska. A public review draft of the strategic plan was available during August and September 1989. The following harvest data is taken from the public review draft of the "Strategic Plan for Management of Moose in Southeast Alaska."

Table 3-215 summarizes moose harvest data for the years 1984 through 1988. The annual moose harvest has ranged from 204 animals in 1984 to 159 animals in 1986. The annual number of hunters has ranged from 1,146 in 1984 to 793 in 1985. The number of hunter-days has ranged from 3,950 in 1986 to 5,782 in 1984. The data in Table 3-215 includes some harvest and hunting from non-National Forest lands, primarily in the Chilkat Valley area.

TABLE 3-215
MOOSE HARVEST DATA FOR THE YEARS 1984 THROUGH 1988 1/

Year	No. of Hunters	No. of Hunter-days	Annual Hunter Kill
1984	1,146	5,782	204
1985	793	4,397	172
1986	860	3,950	159
1987	964	4,172	164
1988	1,008	4,165	202

(Source: ADF&G Strategic Plan for Management of Moose in Region I, Southeast Alaska, Public Review Draft, 1989)
1/This harvest data includes non-National Forest lands, primarily in Game Management Unit 1D, in the Chilkat Valley area.

Table 3-216 summarizes the 1988 moose harvest data for eight areas within the Tongass National Forest, and presents management objectives proposed by the Alaska Department of Fish and Game for the 5-year period from 1990 to 1994. Post-hunt moose population objectives call for stable population numbers with some increases in the Yakutat Forelands and the Nunatak Bench areas. Annual kill objectives for 1994 call for decreases in harvest for four areas (Unuk Chickamin Stikine River, Thomas Bay, and the Chilkat Range), and increases in harvest in four areas (Taku River, Berner's Bay, Yakutat Forelands, and the Nunatak Bench). The number of hunters is expected to increase in six areas and decline in two areas, with the number of hunter-days expected to follow similar trends as the number of hunters.

TABLE 3-216
1988 MOOSE HARVEST STATISTICS AND 1994 MOOSE HARVEST OBJECTIVES FOR AREAS WITHIN THE TONGASS NATIONAL FOREST 1/

Area	Post Hunt Moose #'s 1988	Post Hunt Moose #'s 1994	Annual Kill 1988	Annual Kill 1994	Annual # of Hunters 1988	Annual # of Hunters 1994	Annual Hunter-days 1988	Annual Hunter-days 1994
Unuk/Chickamin (GMU 1A)	35	35	8	3	24	20	123	90
Stikine River Area (GMU 1B)	450	450	58	40	327	300	2,348	2,100
Thomas Bay Area (GMU 1B)	200	200	28	20	120	160	504	675
Taku River Area (GMU 1C)	150	150	17	20	70	100	238	450
Berner's Bay (GMU 1C)	90	90	4	8	5	10	16	30
Chilkat Range (GMU 1C)	150	150	11	10	63	65	196	195
Yakutat Forelands (GMU 5A)	835	850	47	70	153	250	375	1,025
Nunatak Bench (GMU 5A)	NA	50	0	5	0	10	0	60
Total:	1,910	1,975	173	176	762	915	3,800	4,625

Source: ADF&G Strategic Plan for Management of Moose in Region I, Southeast Alaska, Public Review Draft, 1989)

1/Harvest data for the Chilkat Valley area, Game Management Unit 1D, is not included in this table as this area is non-National Forest land.

GRAY WOLF

Table 3-217 displays the number of gray wolves harvested within Alaska Department of Fish and Game "Game Management Units" and "Minor Harvest Units" for the period 1979-80 through 1986-87. Only units which contain National Forest land are displayed in the table. The annual gray wolf harvest has ranged from a low of 63 for the 1979-80 trapping season to a high of 105 for the 1986-87 season. A total of 648 gray wolves were harvested from 1979-80 through the 1986-87 seasons. During this period, 33 percent of the harvest came from Game Management Unit 2, 25 percent from Unit 1A, 16 percent from Unit 3, 10 percent from Unit 1C, 8 percent from Unit 1B, 7 percent from Unit 5A, and 5 percent from Unit 1D.

Data is not collected for total number of trappers or number of trapper-days for wolf or any of the other furbearing (trapped) species.

TABLE 3-217

ANNUAL HARVEST OF GRAY WOLF BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

Game Management Unit 1A

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
101	-	-	-	-	-	-	-	2
303	-	-	2	-	-	-	-	-
404	1	-	-	1	-	-	-	-
405	4	3	6	4	13	-	-	1
406	-	-	-	-	4	2	-	1
407	6	5	5	5	12	-	5	1
408	-	1	-	-	-	-	-	-
509	-	2	2	3	-	2	-	3
510	4	4	1	-	3	1	2	1
612	2	-	-	6	-	6	1	-
614	-	-	-	-	2	-	-	-
716	-	1	-	-	-	-	-	-
717	-	-	1	1	1	2	2	-
719	-	-	-	-	-	-	-	1
820	-	-	-	-	-	-	-	2
821	1	-	-	-	-	-	-	-
822	1	1	3	-	2	-	1	6
823	2	-	-	-	-	-	-	-
Total 1A	21	17	20	20	37	15	11	21

Game Management Unit 1B

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
1601	-	-	-	-	-	-	1	-
1603	-	-	-	-	-	2	-	3
1605	2	1	3	2	2	6	4	2
1707	1	2	1	-	-	-	-	3
1708	-	-	1	-	2	-	-	2
1811	-	-	-	-	-	-	-	2
1812	1	-	-	-	-	1	-	-
1817	-	-	-	6	-	1	4	-
Total 1B	4	3	5	8	4	10	9	12

Game Management Unit 1C

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	-	-	-	-	-	1	-	-
2202	-	-	1	-	-	-	3	-
2304	-	-	-	-	1	-	-	-
2305	-	1	-	-	1	1	-	-
2306	1	2	1	1	-	-	-	-
2409	-	-	1	2	1	2	5	3
2410	-	2	-	-	-	1	-	1
2411	-	-	-	-	-	1	-	-

TABLE 3-217 (Continued)
ANNUAL HARVEST OF GRAY WOLF BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

2412	-	1	-	-	2	-	-	-
2514	-	-	-	1	-	-	-	-
2515	-	-	-	2	1	-	1	1
2517	-	1	1	2	-	-	-	-
2518	1	1	-	-	1	-	2	-
2823	-	-	-	-	-	2	1	1
2825	-	-	-	-	-	1	-	-
2926	3	1	-	-	1	-	3	1
Total 1C	5	9	4	8	8	9	15	7

Game Management Unit 1D
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	-	-	-	-	-	-	-	4
4408	1	-	-	-	-	-	-	-
Total 1D	1	-	-	-	-	-	-	4

Game Management Unit 2
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	-	-	-	-	2	-	-	-
901	-	-	1	-	-	1	-	-
902	-	5	4	1	2	-	-	-
1003	-	-	-	-	1	-	-	-
1105	1	1	1	1	-	-	-	2
1106	-	-	-	1	2	2	5	4
1107	2	2	1	-	-	1	2	1
1108	-	1	-	-	-	-	-	-
1210	-	-	-	1	-	-	-	-
1211	-	-	-	1	-	-	1	2
1212	-	1	-	-	-	1	-	-
1213	-	8	-	1	-	-	-	-
1214	-	-	-	-	2	1	-	-
1315	2	1	2	-	5	3	2	3
1316	-	-	-	1	-	-	-	-
1317	1	4	1	1	-	2	-	4
1318	-	1	2	1	1	4	3	10
1319	-	3	1	-	-	1	1	3
1420	1	4	1	3	1	9	1	-
1421	1	-	1	-	1	-	2	-
1422	1	2	-	2	-	9	1	4
1525	-	1	-	-	-	-	1	1
1526	-	-	-	-	2	-	-	-
1527	1	2	2	1	4	4	-	2
1528	-	1	-	-	2	1	-	2
1529	-	-	3	2	2	3	-	1
Total 2	10	37	20	17	27	42	19	39

TABLE 3-217 (Continued)
ANNUAL HARVEST OF GRAY WOLF BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

Game Management Unit 3
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	1	2	-	-	-	-	1	-
1901	-	4	1	-	-	-	-	1
1903	1	-	1	2	-	-	-	-
1904	-	1	-	-	-	-	-	-
1905	-	-	3	-	-	4	-	5
2007	9	2	2	9	1	-	3	-
2008	1	-	-	-	-	-	-	-
2009	1	-	3	1	-	4	-	-
2010	2	-	2	4	2	2	2	-
2011	1	-	-	-	1	1	-	-
2012	-	-	-	-	6	-	1	1
2013	-	-	-	-	2	-	-	-
2014	-	3	2	1	1	-	3	-
Total 3	16	12	14	17	13	11	10	10

Game Management Unit 5A
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	-	-	-	-	2	-	1	1
4503	6	1	3	4	2	13	3	11
Total 5A	6	1	3	4	4	13	4	12
Grand Total	63	79	66	74	93	100	68	105

Source: ADF&G letter dated April 8, 1988

MARTEN

Table 3-218 displays the number of marten harvested within Alaska Department of Fish and Game "Game Management Units" and "Minor Harvest Units," for the period 1984-85 through 1987-88. Only units which contain National Forest land are displayed in the table. The annual marten harvest has ranged from a low of 1,928 for the 1986-87 trapping season to a high of 3,468 for the 1987-88 season. A total of 11,088 marten were harvested from 1984-85 through the 1987-88 seasons. During this period, 40 percent of the harvest came from Game Management Unit 4, 28 percent from Unit 2, nine percent from Unit 1C, eight percent from Unit 3, seven percent from Unit 1A, six percent from Unit 1B, and two percent from Unit 5A.

For Game Management Unit 4, the harvest was distributed as follows: 65 percent of the harvest was from Chichagof and adjacent islands, 23 percent from Baranof and adjacent islands, and 12 percent from Admiralty and adjacent islands.

Data is not collected for total number of trappers or number of trapper-days for any of the furbearing (trapped) species.

TABLE 3-218
ANNUAL HARVEST OF MARTEN BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

Game Management Unit 1A
Trapping Season

Minor Harvest Unit	84-85	85-86	86-87	87-88
404	-	-	-	7
406	30	20	22	28
407	11	1	13	-
408	-	1	-	-
509	2	-	-	-
510	27	8	17	23
511	-	-	-	7
612	5	9	8	18
613	45	18	26	71
715	2	-	23	52
716	8	-	11	18
717	-	26	-	-
719	22	4	-	-
820	-	39	-	32
822	21	-	-	42
823	12	12	-	-
825	5	-	-	-
826	13	-	7	-
Total 1A	**203**	**138**	**127**	**298**

Game Management Unit 1B
Trapping Season

Minor Harvest Unit	84-85	85-86	86-87	87-88
1601	-	14	10	12
1602	15	6	16	11
1603	17	5	2	12
1605	37	11	32	33
1706	5	-	-	6
1707	50	16	7	3
1708	-	18	33	-
1810	-	4	9	24
1811	-	3	19	28
1812	16	-	-	-
1813	19	-	14	77
1814	-	-	-	50
1816	11	-	7	-
1817	13	6	-	14
Total 1B	183	83	149	270

Game Management Unit 1C
Trapping Season

Minor Harvest Unit	84-85	85-86	86-87	87-88
2202	16	14	10	-
2300	-	-	-	30
2304	1	2	31	36
2305	2	6	-	16

TABLE 3-218 (Continued)
ANNUAL HARVEST OF MARTEN BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

2306	26	17	13	15
2307	17	8	14	37
2400	-	-	-	24
2409	6	25	5	-
2410	-	4	1	-
2412	-	-	1	-
2413	-	-	6	-
2514	13	4	9	10
2515	39	13	19	51
2517	15	4	11	5
2518	8	18	34	23
2519	-	2	-	-
2800	-	-	-	7
2823	17	10	45	11
2825	2	-	13	-
2926	47	-	29	42
2927	36	24	-	43
Total 1C	245	151	241	350

Game Management Unit 1D
Trapping Season

Minor Harvest Unit	84-85	85-86	86-87	87-88
4407	9	-	-	-
Total 1D	9	-	-	-

Game Management Unit 2
Trapping Season

Minor Harvest Unit	84-85	85-86	86-87	87-88
Unknown	34	-	1	2
1105	98	72	21	47
1107	172	65	38	99
1108	100	-	-	93
1209	44	-	-	-
1210	20	53	-	82
1211	43	13	62	56
1212	16	-	22	-
1213	-	-	-	95
1214	35	11	3	37
1315	26	2	23	64
1317	41	70	32	86
1318	152	93	51	100
1319	34	27	6	46
1420	30	-	5	71
1421	72	3	2	69
1422	70	47	6	69
1525	1	67	12	21
1527	22	42	15	65
1528	8	8	2	10
1529	21	16	-	22
Total 2	1,039	589	301	1,134

TABLE 3-218 (Continued)

ANNUAL HARVEST OF MARTEN BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

Game Management Unit 3

Trapping Season

Minor Harvest Unit	84-85	85-86	86-87	87-88
1707	1	-	-	-
1708	4	-	-	-
1901	7	-	-	20
1903	2	-	-	6
1909	6	-	-	-
2007	94	36	78	72
2008	2	2	-	1
2009	42	11	6	101
2010	11	28	3	46
2011	13	33	16	82
2012	30	22	-	24
2013	28	13	-	-
2014	32	10	7	5
Total 3	**272**	**155**	**110**	**357**

Game Management Unit 4

Trapping Season

Minor Harvest Unit	84-85	85-86	86-87	87-88
3000	-	17	-	-
3001	14	6	49	56
3002	14	11	14	14
3003	19	15	20	30
3004	8	-	-	-
3005	8	-	-	-
3008	12	-	-	-
3104	2	12	26	36
3105	-	2	-	10
3206	14	-	13	-
3207	4	-	23	-
3233	6	-	-	-
3312	-	-	5	17
3313	9	54	2	24
3315	11	6	-	10
3348	-	82	-	-
3700	29	55	-	-
3703	31	-	-	-
3726	-	12	-	-
3731	-	-	36	-
3732	-	-	6	74
3733	31	-	-	71
3734	5	1	10	15
Subtotal Baranof and adj islands	**217**	**273**	**204**	**357**

Game Management Unit 4

Trapping Season

Minor Harvest Unit	84-85	85-86	86-87	87-88
3300	147	139	144	-
3308	41	21	-	63

TABLE 3-218 (Continued)
ANNUAL HARVEST OF MARTEN BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

3309	-	33	3	18
3310	41	-	13	-
3311	7	6	1	20
3400	7	-	10	-
3416	15	29	18	40
3417	-	18	26	67
3418	38	-	-	-
3419	67	76	-	30
3420	39	-	3	-
3500	70	-	21	-
3522	28	37	1	29
3523	323	212	156	99
3524	50	-	11	38
3600	7	203	64	-
3623	8	-	61	-
3626	20	14	14	39
3627	81	35	-	-
3628	-	56	-	-
3629	18	-	-	7
3630	12	-	24	2
Subtotal Chichagof & adj. Islands	1,019	879	570	452

Game Management Unit 4
Trapping Season

Minor Harvest Unit	84-85	85-86	86-87	87-88
3800	-	-	4	15
3835	9	-	-	14
3836	14	-	22	39
3837	-	1	-	13
3938	-	24	24	2
3939	38	21	5	16
3940	14	-	18	-
4000	-	-	50	-
4042	-	-	-	40
4044	-	-	16	-
4145	19	-	-	1
4146	19	-	-	2
4147	-	5	35	7
4148	6	4	14	5
Sub-total Admiralty & adj. Islands	119	55	188	154
Total all 4	1,355	1,207	962	963

Game Management Unit 5A
Trapping Season

Minor Harvest Unit	84-85	85-86	86-87	87-88
4500	-	-	-	21
4503	63	-	38	75
Total 5A	63	-	38	96
Grand Total	3,369	2,323	1,928	3,468

Source: ADF&G letter dated April 8, 1988.

RIVER OTTER

Table 3-21[illegible] displays the number of river otter harve[illegible] Alaska [illegible] Department of Fish and Game "Game Management Units" and "Minor Harvest Units," for the period 1979-80 through 1986-87. Only units which contain National Forest land are displayed in the table. The annual river otter harvest has ranged from a high of 652 for the 1979-season to a low of 373 for the 1986-87 trapping season. A total of 3,974 river otters were harvested from 1979-80 through the 1986-87 seasons. During this period, 32 percent of the harvest came from Game Management Unit 4, 29 percent from Unit 2, 14 percent from each of Units 3 and 1A, six percent from Unit 1C, four percent from Unit 1B, one percent from Unit 5A.

Data is not collected for total number of trappers or number of trapper-days for river otter or any of the other furbearing (trapped) species.

TABLE 3-219

ANNUAL HARVEST OF RIVER OTTER BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

Game Management Unit 1A

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	-	1	-	-	-	-	-	-
101	5	1	4	8	12	17	3	[illegible]
303	10	-	8	-	-	-	21	-
404	-	5	-	-	-	-	-	-
405	6	5	10	13	-	-	-	[illegible]
406	-	15	-	-	3	[illegible]	-	[illegible]
407	4	7	4	6	4	[illegible]	-	-
408	3	3	-	-	1	-	6	6
509	10	-	1	12	1	4	-	2
510	11	1	10	4	6	5	1	8
511	2	-	-	-	-	-	-	2
612	5	-	4	-	1	-	1	-
613	5	2	1	1	3	5	12	6
715	11	6	6	-	19	-	-	12
716	2	9	-	-	-	12	-	-
719	-	-	-	1	-	4	2	-
820	-	-	-	2	-	-	-	2
821	1	-	-	-	-	-	-	-
822	24	1	1	5	4	-	7	-
823	25	7	-	2	-	5	-	-
Total 1A	**124**	**63**	**49**	**54**	**54**	**65**	**69**	**63**

Game Management Unit 1B

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
1601	-	4	-	-	-	-	-	-
1602	-	3	-	-	2	-	-	1
1603	9	5	1	2	1	2	-	1
1604	-	-	4	-	-	-	-	-
1605	-	1	3	1	-	-	5	5
1706	-	2	1	-	1	-	-	-
1707	-	1	8	-	-	1	-	-
1708	-	1	-	-	-	-	1	1
1810	6	-	-	-	-	-	-	1
1811	4	7	6	5	8	-	1	-
1812	3	2	-	-	-	1	-	-
1813	5	3	-	-	-	-	-	-
1814	1	1	2	5	-	1	-	-
1815	-	1	-	-	-	-	-	-
1816	-	-	-	-	1	-	-	-
1817	-	2	2	9	-	9	1	-
Total 1B	**28**	**33**	**27**	**22**	**13**	**14**	**8**	**9**

Game Management Unit 1C

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	-	-	-	-	-	-	-	1
2202	-	-	-	3	3	2	-	2
2203	-	-	-	-	4	-	-	-

TABLE 3-219 (Continued)
ANNUAL HARVEST OF RIVER OTTER BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

2304	-	3	1	-	-	1	2	2
2305	-	-	-	1	-	-	16	1
2306	5	9	2	-	-	-	-	-
2409	2	5	2	7	8	[illegible]	2	3
2410	-	-	-	-	-	-	1	-
2514	6	-	8	3	2	-	1	
2515	4	1	-	4	13	9	1	10
2517	3	2	-	-	1	-	-	-
2518	-	-	-	-	2	1	1	-
2620	-	-	-	-	1	-	-	-
2621	3	-	-	3	2	1	-	1
2722	10	2	-	2	-	1	1	3
2823	-	-	8	-	-	8	1	3
2825	-	-	-	-	1	1	-	-
2926	4	-	6	1	-	1	-	5
2927	-	12	-	-	1	-	9	-
Total 1C	37	34	27	24	38	29	35	31

Game Management Unit 1D
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
4408	-	2	-	-	-	-	-	-

Game Management Unit 2
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	1	-	-	-	12	2	-	-
901	11	1	-	-	-	-	-	-
902	-	8	-	-	14	-	-	-
1003	-	-	-	2	5	-	-	-
1104	-	-	1	-	-	-	-	-
1105	29	-	-	-	2	4	10	-
1106	21	-	3	3	-	4	1	-
1107	27	-	-	-	2	30	13	2
1108	-	3	-	-	-	5	-	-
1209	-	-	-	1	2	-	-	-
1210	-	-	-	2	2	1	1	-
1211	4	4	9	15	8	1	-	1
1212	6	5	5	10	4	-	-	-
1213	2	4	4	8	4	-	-	-
1214	10	7	4	21	3	8	-	-
1315	20	1	4	6	13	10	4	-
1317	7	2	3	-	5	8	4	7
1318	18	17	6	7	21	68	22	10
1319	1	9	4	-	2	5	11	2
1420	6	3	-	-	-	12	5	-
1421	4	4	9	19	-	6	2	-
1422	14	24	-	-	11	18	1	-
1525	-	-	1	9	1	1	19	[illegible]
1526	-	9	-	2	41	-	3	6
1527	32	30	37	9	5	12	38	15
1528	8	1	2	-	3	3	5	3

TABLE 3-219 (Continued)

ANNUAL HARVEST OF RIVER OTTER BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

1529	14	6	18	4	-	5	2	2
Total 2	235	138	110	118	160	193	141	62

Game Management Unit 3

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
1901	7	20	32	-	7	-	-	-
1903	8	2	4	2	1	9	-	2
1904	2	16	1	8	-	25	-	
1906	-	24	-	34	-	42	-	
2007	9	5	3	4	6	13	2	11
2008	-	-	2	8	12	8	10	[illegible]
2009	2	4	15	1	11	-	1	4
2010	2	2	4	4	-	4	16	16
2011	5	4	4	2	-	-	3	3
2012	5	3	-	1	6	3	10	3
2013	3	1	-	-	3	19	-	
2014	11	9	11	3	-	18	2	2
Total 3	54	90	76	67	46	141	51	45

Game Management Unit 4

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
3000	6	5	2	52	-	13	-	-
3001	6	9	8	9	10	21	13	33
3002	7	2	5	2	1	10	3	2
3003	8	6	3	3	1	7	1	1
3031	-	-	-	-	-	-	1	-
3100	-	-	3	2	-	-	-	-
3104	5	5	2	-	-	1	1	1
3105	1	-	-	-	-	-	-	-
3200	1	-	-	-	-	-	-	-
3206	5	-	3	1	-	8	-	1
3207	1	1	-	-	-	2	-	3
3312	2	1	5	-	3	2	2	1
3313	-	1	1	15	1	10	-	2
3315	6	4	-	3	6	2	2	-
3703	-	-	10	1	-	3	-	-
3731	-	-	-	-	17	4	-	2
3732	-	-	-	-	-	4	-	-
3733	-	-	-	1	3	2	-	-
3734	-	-	2	3	-	6	3	2
Subtotal Baranof & adj. Islands	**48**	**34**	**44**	**92**	**42**	**95**	**26**	**48**

Game Management Unit 4

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
3300	14	14	7	-	32	-	-	17
3305	-	-	-	-	-	-	3	-
3308	-	2	4	4	-	1	4	1
3309	-	-	-	-	1	3	-	-

TABLE 3-219 (Continued)
ANNUAL HARVEST OF RIVER OTTER BY ADF&G HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

3310	1	4	16	10	-	3	3	1
3311	11	12	12	3	-	5	1	[illegible]
3400	10	23	7	-	-	-	-	-
3416	1	24	3	-	-	-	-	-
3417	-	6	2	-	3	-	2	-
3418	-	-	-	-	-	3	-	-
3419	13	2	-	-	4	5	3	3
3521	1	-	-	-	-	-	1	-
3522	-	-	-	-	-	1	-	-
3523	16	-	4	-	4	8	5	9
3524	-	-	-	-	-	-	-	1
3600	18	-	28	11	-	-	55	-
3625	13	6	11	4	3	-	7	-
3626	-	1	-	-	-	-	3	-
3627	-	-	-	-	-	2	-	1
3629	-	1	-	-	-	7	-	1
3630	-	-	-	-	-	6	-	2
Sub-Total Chichagof & adj. Islands	**98**	**95**	**94**	**32**	**47**	**44**	**87**	**42**

Game Management Unit 4
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
3835	3	-	-	-	-	-	-	-
3836	-	-	6	-	3	8	1	2
3837	-	-	-	-	1	1	1	-
3938	-	8	-	-	12	-	14	21
3939	4	6	18	7	2	17	8	3
3940	-	8	-	5	-	-	-	-
4000	-	-	-	-	-	-	-	13
4041	4	-	-	-	-	-	-	1
4042	-	17	-	23	-	-	-	-
4100	15	-	17	-	-	-	-	-
4145	-	-	5	-	2	-	-	-
4146	-	-	-	-	-	1	-	-
4147	-	-	-	4	4	-	4	9
4148	-	-	-	1	-	1	1	-
Sub-Total Admiralty & adj. Islands	**26**	**39**	**46**	**40**	**24**	**28**	**29**	**49**
Unknown	-	-	-	-	4	-	-	22
Total 4	**172**	**168**	**184**	**164**	**117**	**167**	**142**	**161**

Game Management Unit 5A
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	-	3	-	-	-	-	-	-
4503	2	2	4	1	2	1	3	2
Total 5A	2	5	4	1	2	1	3	2
Grand Total	652	533	477	450	430	610	449	373

Source: ADF&G, letter dated April 8, 1988.

LYNX

Lynx are present only on the mainland in Southeast Alaska. For trapping seasons from 1979-80 through 1986-87, a total of 14 lynx were harvested (Table 3-220). Fifty-seven percent of the harvest came from Game Management Unit 5A, which is the Yakutat area.

TABLE 3-220
ANNUAL HARVEST OF LYNX BY ADF&G MINOR HARVEST UNITS WHICH INCLUDE THE TONGASS NATIONAL FOREST

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Game Management Unit 1C — Trapping Season								
2305	-	-	-	1	-	-	-	-
2306	-	-	-	1	-	-	-	-
2409	-	-	-	-	1	-	-	-
2413	-	-	-	-	-	1	-	-
Total 1C	-	-	-	2	1	1	-	-
Game Management Unit 1D — Trapping Season								
Unknown	-	-	-	-	-	-	1	-
4407	-	-	-	1	-	-	-	-
Total 1D	-	-	-	1	-	-	1	
Game Management Unit 5A — Trapping Season								
Unknown	-	-	-	-	1	-	-	-
4503	-	1	-	4	-	-	2	-
Total 5A	-	1	-	4	1	-	2	-
Grand Total	-	1	-	7	2	1	3	-

Source: ADF&G, letter dated April 8, 1988

WOLVERINE

Wolverine are not present in Game Management Unit 4, which includes Admiralty, Baranof, Chichagof and the smaller adjacent islands. They are apparently not present, or are only present in a few locations on the islands in Game Management Unit 2 (Prince of Wales and adjacent islands). Trapping records for the period 1979-80 through 1986-87 show that a total of 132 wolverine were trapped, with 41 percent of the harvest coming from Game Management Unit 1C, 30 percent from Unit 1B, 11 percent from Unit 3, seven percent from each of Units 1A and 5A, four percent from Unit 1D, and one percent (1 animal) from Unit 2 (Table 3-221).

TABLE 3-221
ANNUAL HARVEST OF WOLVERINE BY ADF&G MINOR HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

Game Management Unit 1A
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
613	1	-	-	-	-	-	-	-
715	-	-	-	-	-	-	-	2
716	-	-	-	1	-	-	-	-
719	-	1	-	-	-	1	-	-
822	2	1	-	-	-	-	-	-
Total 1A	3	2	-	1	-	1	-	2

Game Management Unit 1B
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
1603	-	-	-	1	-	-	-	-
1605	-	-	-	1	-	-	-	1
1707	-	-	-	-	-	-	-	4
1708	-	-	1	3	-	2	2	3
1811	2	1	3	2	-	-	-	4
1813	1	1	-	-	-	2	2	3
Total 1B	3	2	4	7		4	4	15

Game Management Unit 1C
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
2305	-	1	-	-	-	-	-	-
2307	-	1	-	-	-	-	-	-
2408	-	-	-	-	-	-	1	-
2409	-	-	1	1	-	1	3	-
2410	-	-	-	-	-	-	1	-
2411	-	-	-	-	-	2	1	-
2412	1	-	-	-	-	-	-	-
2413	-	-	-	-	-	-	-	2
2515	-	-	-	4	-	1	-	-
2516	-	1	-	-	-	-	-	-
2517	2	3	3	6	-	1	-	-
2518	-	-	-	-	-	-	2	-
2823	-	-	-	-	-	3	1	4
2926	-	-	2	1	-	1	-	3
Total 1C	3	6	6	12	-	9	9	9

Game Management Unit 1D
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	-	-	-	-	-	-	-	1
4407	1	-	-	-	-	3	-	-
Total 1D	1	-	-	-	-	3	-	1

TABLE 3-221 (Continued)
ANNUAL HARVEST OF WOLVERINE BY ADF&G MINOR HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

Game Management Unit 2
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
1422	-	-	-	1	-	-	-	-

Game Management Unit 3
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	-	1	-	-	-	-	-	1
2007	-	-	1	2	-	3	5	1
2011	1	-	-	-	-	-	-	-
Total 3	1	1	1	2	-	3	5	2

Game Management Unit 5A
Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
4503	3	1	2	-	-	1	-	1
4504	-	-	1	-	-	-	-	-
Total 5A	3	1	3	-	-	1	-	1
Grand Total	14	12	14	23	-	21	18	30

Source: ADF&G, letter dated April 8, 1988.

BEAVER

Beaver harvests are summarized in Table 3-222. Prior to the 1984-85 trapping season, beaver harvest data was collected only on a Game Management Unit basis, or was not collected at all. For the 1984-85 through 1986-8 trapping seasons, a total of 1,696 beaver were trapped, with 60 percent of the harvest coming from Game Management Unit 2, 11 percent from Unit 3, 10 percent from each of Units 1B and 1C, seven percent from Unit 1A, and one percent from each of Units 4 and 5A (Table 3-222). There has not been an open season in the entire area west of Chatham Strait (Game Management Unit 4) since 1980-81.

TABLE 3-222

ANNUAL HARVEST OF BEAVER BY ADF&G MINOR HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

Game Management Unit 1A

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	-	-	-	-	95	-	-	-
101	-	-	-	-	-	2	1	5
404	-	-	-	-	-	1	-	-
406	-	-	-	-	-	5	4	27
407	-	-	-	-	-	15	1	13
408	-	-	-	-	-	3	-	-
510	-	-	-	-	-	4	-	2
614	-	-	-	-	-	-	-	1
716	-	-	-	-	-	8	14	4
717	-	-	-	-	-	1	-	-
Total 1A	-	-	-	-	95	39	20	52

Game Management Unit 5A

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
1603	-	-	-	-	-	-	1	-
1605	-	-	-	-	-	4	27	37
1707	-	-	-	-	-	-	4	27
1708	-	-	-	-	-	-	8	40
1813	-	-	-	-	-	-	-	9
1816	-	-	-	-	-	-	-	9
Total 1B	-	-	-	-	-	4	40	122

Game Management Unit 1C

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	133	111	32	68	96	-	-	-
2304	-	-	-	-	-	-	1	13
2410	-	-	-	-	-	-	3	11
2514	-	-	-	-	-	-	-	11
2515	-	-	-	-	-	5	8	41
2518	-	-	-	-	-	2	12	10
2620	-	-	-	-	-	29	-	12
2621	-	-	-	-	-	-	-	8
2926	-	-	-	-	-	-	-	1
Total 1C	133	111	32	68	96	36	24	108

Game Management Unit 2

Trapping Season

Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	106	199	53	129	45	-	-	14
1106	-	-	-	-	-	-	8	8
1107	-	-	-	-	-	23	20	19
1212	-	-	-	-	-	-	-	1
1214	-	-	-	-	-	-	3	3
1315	-	-	-	-	-	9	12	5
1316	-	-	-	-	-	-	5	-
1317	-	-	-	-	-	41	33	37
1318	-	-	-	-	-	25	32	42

TABLE 3-221

ANNUAL HARVEST OF WOLVERINE BY ADF&G MINOR HARVEST UNITS WITHIN THE TONGASS NATIONAL FOREST

1319	-	-	-	-	-	19	147	42
1420	-	-	-	-	-	-	13	35
1421	-	-	-	-	-	22	-	20
1422	-	-	-	-	-	72	53	110
1527	-	-	-	-	-	12	44	60
1528	-	-	-	-	-	5	9	5
1529	-	-	-	-	-	6	-	10
Total 2	106	199	53	129	45	234	379	411
Game Management Unit 3								
Trapping Season								
Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	75	17	8	11	25	-	1	-
1901	-	-	-	-	-	-	4	-
1903	-	-	-	-	-	-	2	-
1905	-	-	-	-	-	3	-	-
2007	-	-	-	-	-	22	25	38
2008	-	-	-	-	-	10	4	-
2009	-	-	-	-	-	-	-	11
2010	-	-	-	-	-	-	8	4
2011	-	-	-	-	-	-	8	-
2012	-	-	-	-	-	14	18	-
2013	-	-	-	-	-	3	-	-
2014	-	-	-	-	-	-	-	14
Total 3	**75**	**17**	**8**	**11**	**25**	**52**	**70**	**67**
Game Management Unit 4								
Trapping Season								
Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	1	2	9	-	-	-	-	-
3835	-	-	-	-	-	-	-	2
3837	-	-	-	-	-	1	-	2
3939	-	-	-	-	-	12	4	-
4041	-	-	-	-	-	-	-	-1
4042	-	-	-	-	-	1	-	-
TOTAL 04	1	2	9	-	-	14	4	5
Game Management Unit 5A								
Trapping Season								
Minor Harvest Unit	79-80	80-81	81-82	82-83	83-84	84-85	85-86	86-87
Unknown	-	-	-	-	4	-	-	-
4503	-	-	-	-	-	1	6	8
Total 05A	-	-	-	-	4	1	6	8
Grand Total 1/						380	543	773

Source: ADF&G, letter dated August 18, 1988.

1/ Prior to the 1984-85 trapping season, harvest data wasa either collected on a Game Management Unit basis or was not collected at all. A grand total is only meaningful beginning in the 1984-85 season.

2/ Years without any data (designated by a -) reflect no recorded information.

Southeast Alaska accounts for a large portion of the [illegible] marten, river otter, and weasel (Table 3-223) (Alaska Department of Fish and [illegible] 1986). The average market values for furbearer pelts is summarized in Table 3-224. Table 3-225 displays the estimated total raw fur value for Southeast Alaska.

TABLE 3-223

RAW PELTS EXPORTED FROM SOUTHEAST ALASKA AND PERCENT OF STATEWIDE EXPORTS, 1979-80 through 1983-84

Species	1979-80 Number Exported	1979-80 % of State	1980-81 Number Exported	1980-81 % of State	1981-82 Number Exported	1981-82 % of State	1982-83 Number Exported	1982-83 % of State	1983-84 Number Exported	1983-84 % of State
Beaver	262	3	143	2	76	1	56	2	195	8
Mink	3,336	45	3,290	22	3,292	12	1,072	14	919	10
Muskrat	30	0	60	0	33	0	19	0	35	0
Marten	3,514	13	1,161	5	2,434	10	976	6	2,022	15
River Otter	502	35	365	26	395	27	206	24	171	19
Red Fox	1	0	0	0	9	0	13	0	16	0
Weasel	62	13	29	13	28	15	28	12	40	17
Lynx	1	0	0	0	6	0	33	0	12	0
Squirrel	26	3	36	6	78	15	35	17	10	5

Source: Alaska Department of Fish and Game, 1986.

TABLE 3-224

AVERAGE MARKET VALUES FOR FURBEARER PELTS

Species	1979-80	1980-81	1981-82	1982-83	1983-84
Beaver	$47.46	$43.00	$25.42	$25.42	$22.00
Muskrat	5.05	4.00	3.05	2.80	3.50
Mink	45.61	49.00	46.43	31.19	27.00
Gray Wolf	220.33	255.00	227.50	180.38	262.00
Red Fox	97.00	90.00	88.86	51.66	75.00
Weasel	1.40	1.40	.88	5.00	2.00
River Otter	79.29	44.00	41.43	39.10	32.00
Squirrel	1.00	1.40	1.00	1.48	1.00
Marten	46.40	38.00	42.34	56.61	51.00
Wolverine	224.24	171.00	232.24	203.00	230.00
Lynx	289.15	235.00	275.86	263.07	312.00

Source: Alaska Department of Fish and Game, 1986.

TABLE 3-225

ESTIMATED TOTAL RAW FUR VALUE FOR SOUTHEAST ALASKA

1979-80	1980-81	1981-82	1982-83	1983-84
$526,273	$452,824	$325,336	$227,394	$356,917

Source: Alaska Department of Fish and Game, 1986.

WATERFOWL

Table 3-226 summarizes waterfowl hunting statistics for Southeast Alaska. Waterfowl hunters, hunter-days and harvest have declined during the 1980's. The reason for the decline is not understood.

TABLE 3-226
WATERFOWL HUNTING STATISTICS FOR SOUTHEAST ALASKA 1/

Species	1983	1984	1985	1986	1987	[illegible]
Waterfowl						
Number of Hunters	2,446	2,114	1,840	1,6[illegible]	-	-
Number of hunter-days 2/	14,433	13,533	[illegible]	10,130	-	-
Annual Waterfowl Harvest						
Ducks	15,928	14,251	[illegible]	[illegible]	-	-
Seaducks	-	3,217	2,082	1,322	-	-
Cranes	-	14	0	0	-	-
Snipe	-	831	1,764	344	-	-
Geese	-	1,640	2,315	1,818	-	-

Source: Alaska Department of Fish and Game

1/ Waterfowl data are for all of Southeast Alaska; data are not available for smaller geographic units.

2/ Hunter-days are compiled by the Alaska Department of Fish and Game; one hunter day is equal to one person hunting for any length of time during a 24-hour period. A person hunting for one hour is the equivalent of one hunter day, and a person hunting for 8 hours is also the equivalent of one hunter day.

3/ Years without any data (designated by a -) reflect no recorded information.

Table 3-227 displays a comparison of the hunting and trapping season lengths and the harvest limits for the 1980-81 seasons and the 1988-89 seasons.

TABLE 3-227

HUNTING AND TRAPPING SEASON LENGTHS AND HARVEST LIMITS FOR 1980-81 SEASONS AND 1988-89 SEASONS

Species	Game Management Unit	1980-81 Season Length/Bag Limit	1988-89 Season Length/Bag Limit
Deer	1A	122 days / 3 antlered	153 days / 4 antlered
	1B	91 days / 4 antlered	153 days / 2 antlered
	1C	153 days / 4 either sex 1/	153 days / 4 either sex 1/
	1D	No Open Season	No Open Season
	2	122 days / 3 antlered	153 days / 4 antlered
	3	No Open Season 2/	No Open Season 2/
	4	122-153 days / 3-4 either sex 1/	184 days / 3-6 either sex 3/
	5A	No Open Season	No Open Season
Black Bear	1A	Sept. 1-June 30 / 2 bear	Sept. 1-June 30 / 2 bear
	1B	Sept. 1-June 15 / 1 bear	Sept. 1-June 30 / 2 bear
	1C	Sept. 1-June 15 / 1 bear	Sept. 1-June 30 / 2 bear
	1D	Sept. 1-June 30 / 2 bear	Sept. 1-June 30 / 2 bear
	2	Sept. 1-June 30 / 2 bear	Sept. 1-June 30 / 2 bear
	3	Sept. 1-June 15 / 1 bear	Sept. 1-June 30 / 2 bear
	4	Sept. 1-June 30 / 2 bear 4/	No Open Season
	5A	Sept. 1-June 30 / 2 bear	Sept. 1-June 30 / 2 bear
Brown Bear	1A	Sept. 1-May 31 / 1 per 4 yrs	Sept. 15-May 31 / 1 per 4 yrs
	1B	Sept. 1-May 31 / 1 per 4 yrs	Sept. 15-May 31 / 1 per 4 yrs
	1C	Sept. 1-May 31 / 1 per 4 yrs	Sept. 15-May 31 / 1 per 4 yrs
	1D	Sept. 1-May 31 / 1 per 4 yrs	Sept. 15-May 31 / 1 per 4 yrs
	2	No Open Season	No Open Season
	3	Sept. 1-May 31 / 1 per 4 yrs	No Open Season
	4 5/	Sept.15-May 31 / 1 per 4 yrs	Sept. 15-May 31 / 1 per 4 yrs
	5A	Sept. 1-May 31 / 1 per 4 yrs	Sept. 15-May 31 / 1 per 4 yrs
Mountain Goat	1A		153 days / 2 (registered permit)
	1B		153 days / 2 (registered permit)
	1C		61 days / 1 (registered permit)
	1D		77-153 days / 1 (registered permit)
	2		No Open Season
	3		No Open Season
	4		153 days / 1 (registered permit)
	5A		153 days / 1 (registered permit)
Moose	1A	31 days / 1 antlered	31 days / 1 antlered
	1B	31 days / 1 antlered	15-31 days / 1 antlered (reg.permit)
	1C 6/	31 days / 1 antlered	31 days / 1 antlered (reg.permit)
	1D	16 days / 1 antlered	Subsistence Hunt Only
	2	No Open Season	No Open Season
	3	No Open Season	No Open Season
	4	No Open Season	No Open Season
	5A	4-31 days / 1 antlered	31 days / 50 antlered 7/

TABLE 3-227 (Continued)
HUNTING AND TRAPPING SEASON LENGTHS AND HARVEST LIMITS FOR 1980-81 SEASONS AND 1988-89 SEASONS

Species	Game Management Unit	1980-81 Season Length/Bag Limit	1988-89 Season Length/Bag Limit
Beaver	1A	166 days / no limit	166 days / no limit
	1B	166 days / no limit	166 days / no limit
	1C	166 days / no limit	166 days / no limit
	1D	No Open Season	No Open Season
	2	166 days / no limit	166 days / no limit
	3	77-166 days / no limit	136-166 days / no limit
	4 8/	166 days / no limit	166 days / no limit
	5A	187 days / no limit	187 days / no limit
Red Fox	1A	62 days / no limit	77 days / no limit
	1B	62 days / no limit	77 days / no limit
	1C	98 days / no limit	77 days / no limit
	1D	77 days / no limit	77 days / no limit
	2	62 days / no limit	77 days / no limit
	3	62 days / no limit	77 days / no limit
	4	62-83 days / no limit	77 days / no limit
	5A	98 days / no limit	77 days / no limit
Lynx	1A	77 days / no limit	77 days / no limit
	1B	77 days / no limit	77 days / no limit
	1C	98 Days / no limit	77 days / no limit
	1D	77 days / no limit	77 days / no limit
	2	77 days / no limit	77 days / no limit
	3	77 days / no limit	77 days / no limit
	4	77-98 days / no limit	77 days / no limit
	5A	98 days / no limit	77 days / no limit
Marten, Mink, Weasel River Otter	1A	77 days / no limit	77 days / no limit
	1B	77 days / no limit	77 days / no limit
	1C	98 days / no limit	77 days / no limit
	1D	77 days / no limit	77 days / no limit
	2	77 days / no limit	77 days / no limit
	3	77 days / no limit	77 days / no limit
	4	77-98 days / no limit	77 days / no limit
	5A	98 days / no limit	98 days / no limit
Muskrat	1A	105 days / no limit	77 days / no limit
	1B	105 days / no limit	77 days / no limit
	1C	126 days / no limit	77 days / no limit
	1D	105 days / no limit	77 days / no limit
	2	105 days / no limit	77 days / no limit
	3	105 days / no limit	77 days / no limit
	4	105-126 days / no limit	77 days / no limit
	5A	126 days / no limit	77 days / no limit

TABLE 3-227 (Continued)
HUNTING AND TRAPPING SEASON LENGTHS AND HARVEST LIMITS FOR 1980-81 SEASONS AND 1988-89 SEASONS

Species	Game Management Unit	1980-81 Season Length/Bag Limit	1988-89 Season Length/Bag Limit
Gray Wolf	1A	181 days / no limit	172 days / no limit
	1B	181 days / no limit	172 days / no limit
	1C	181 days / no limit	172 days / no limit
	1D	181 days / no limit	172 days / no limit
	2	181 days / no limit	172 days / no limit
	3	181 days / no limit	172 days / no limit
	4	Wolves are not present	Wolves are not present
	5A	172 days / no limit	172 days / no limit
Wolverine	1A	77 days / no limit	172 days / no limit
	1B	77 days / no limit	172 days / no limit
	1C	98 days / no limit	172 days / no limit
	1D	77 days / no limit	172 days / no limit
	2	77 days / no limit	172 days / no limit
	3	77 days / no limit	172 days / no limit
	4	62-83 days / no limit	172 days / no limit
	5A	98 days / no limit	172 days / no limit

Source: ADF&G Hunting and Trapping Regulations.

1/ Either sex harvest is only allowed during a portion of the hunting season.

2/ A few islands within Game Unit 3 have been open for antlered only harvest, however most of the unit has had no open season.

3/ For the northeast part of Chichagof Island, rural residents were allowed to harvest 6 deer, and non-rural hunters were allowed to harvest 3 deer.

4/ Regulations permitted hunting black bear in Unit 4, however there are no black bear within the unit.

5/ The northeast part of Chichagof Island was closed to taking of brown bear during the 1988-89 season.

6/ For 1980-81 season, a portion of Unit 1C was a permit hunt for moose. For 1988-89 season, a portion of Unit 1C was a registered permit hunt, and a portion was a drawing permit hunt with 5 permits issued.

7/ For 1988-89 season, a maximum harvest of 50 antlered moose was allowed.

8/ For Unit 4, the area west of Chatham Strait has had no open season for beaver from 1980-81 to the present time.

SUMMARY OF CURRENT AND PROJECTED HUNTER DEMAND

Table 3-228 displays a summary of historic (1980-1988) and projected (1995-2035) hunter demand for deer, moose, mountain goat, black bear, and waterfowl in for the Tongass National Forest. Moose and mountain goat demand projections for 1995-2035 are held constant because demand currently exceeds capacity for these species. Waterfowl demand projections for 1995-2035 are held constant, because it is not anticipated that the declines in waterfowl hunter days which occurred during the 1980's will continue. It is not possible to predict if future waterfowl demand will increase.

The current capacity of the Forest for deer, brown bear and black bear is estimated as follows:

Deer. The deer hunting activity previously presented for the 1980's probably represents what could be expected in any decade. Many factors influence deer numbers and hunting activity, including weather patterns, access, habitat capability, etc. For the period 1980 through 1988 (excluding 1981) there were a total of 100,602 deer killed, and a total of 418,041 hunter days, for an average of 4.2 hunter days spent to harvest one deer. The current winter habitat capability for the Forest is estimated to be between 267,580 and 296,749 deer. Assuming a 1.1 annual finite rate of increase in the deer population, and a 10 percent harvest rate, a total of 29,434 to 32,642 deer are potentially available for harvest. At an average of 4.2 hunter days per deer harvested, the hunter day capacity for the Forest is estimated at 123,623 to 137,096 hunter days.

Brown Bear. For the period 1980 through 1987, there were a total of 900 brown bears killed by hunters, and a total of 4,163 hunter days by successful hunters, for an average of 4.6 hunter days spent to harvest one bear by successful hunters. The current habitat capability for the Forest is estimated to be between 9,732 and 9,960 bears. Assuming a five percent annual harvest rate, a total of 487 to 498 bears could be harvested annually. From 1980 through 1987, 95 bears were killed from causes other than hunting, representing about 10 percent of the total kill. However, it is expected that additional bears are killed from human/bear conflicts that are not known. If 30 percent of the annual harvest were from human/bear conflicts, and 70 percent from hunting, there is current potential for an annual hunting harvest of 341 to 349 bears. At an average of 4.6 hunter days per successful hunter, the successful hunter day capacity for the Forest is estimated at 1,569 to 1,605 hunter days.

Black Bear. For the period 1980 through 1987, there were a total of 2,891 black bears killed by hunters, and a total of 9,236 hunter days by successful hunters, for an average of 3.2 hunter days spent to harvest one bear by successful hunters. The current habitat capability for the Forest is estimated to be between 13,616 and 14,270 bears. Assuming a seven percent annual harvest rate, a total of 953 to 999 bears could be harvested annually. From 1980 through 1987, 105 bears were killed from causes other than hunting, representing about four percent of the total kill. However, it is expected that additional bears are killed from human/bear conflicts that are not known. If 12 percent of the annual harvest were from human/bear conflicts, and 88 percent from hunting, there is current potential for an annual hunting harvest of 839 to 879 bears. At an average of 3.2 hunter days per successful hunter, the successful hunter day capacity for the Forest is estimated at 2,685 to 2,813 hunter days.

TABLE 3-228
HISTORIC (1980-1988) AND PROJECTED (1995-2035) HUNTER DEMAND FOR WILDLIFE RESOURCES, IN THOUSANDS OF HUNTER DAYS (MHD's).

Year	Deer MHD's	Moose MHD's	Mtn. Goat MHD's	Black Bear MHD's 1/	Brown Bear MHD's 1/	Waterfowl MHD's
1980	31.4	-	1.4	.8	.5	-
1981	-	-	1.8	.8	.4	-
1982	45.7	-	1.8	1.0	.4	-
1983	52.6	-	1.7	.9	.6	14.4
1984	54.5	5.8	1.5	1.1	.6	13.5
1985	50.3	4.4	1.5	1.4	.5	10.1
1986	67.2	4.0	1.4	1.6	.6	10.1
1987	67.0	4.2	1.3	1.7	.7	-
1988	49.4	4.2	-	-	-	-
1995	83.3	4.6	1.7	2.6	.9	10.1
	(47.9-118.7) 2/			(2.0-3.2)	(.5-1.2)	
2005	104.1	4.6	1.7	3.5	1.1	10.1
	(52.6-155.6)			(2.6-4.4)	(.5-1.6)	
2015	120.0	4.6	1.7	4.1	1.2	10.1
	(55.2-184.8)			(3.0-5.3)	(.6-1.9)	
2025	128.5	4.6	1.7	4.5	1.3	10.1
	(56.5-200.5)			(3.2-5.7)	(.6-2.0)	
2035	136.9	4.6	1.7	4.8	1.4	10.1
	(57.6-216.2)			(3.5-6.2)	(.6-2.2)	

Source: 1980 through 1988 hunter days are from Alaska Department of Fish and Game records. 1995 to 2035 projections are U. S. Forest Service demand projections derived from historic use, and market area populations and projected future population estimates (except for the 1995 moose projection which is from Alaska Department of Fish and Game "Strategic Plan for Management of Moose in Region I, Southeast Alaska 1990-94, Public Review Draft").

1/ Hunter day data for black bear and brown bear are for successful hunters only: the number of hunter days for unsuccessful hunters in unknown.

2/ Numbers in brackets ( ) are 95 percent confidence intervals for the projected demands for deer, black bear, and brown bear.

EXISTING DIRECTION

The Southeast Alaska Area Guide, the Regional Guide, and the existing Tongass Land Management Plan all provide standards and guidelines for managing the wildlife resources on the Tongass National Forest. The following 14 items summarize the standards and guidelines from these three documents (ref: Appendix B of the Final Environmental Impact Statement for the Alaska Regional Guide

1. The Forest Service, the Alaska Department of Fish and Game, the Alaska Department of Environmental Conservation, the National Marine Fisheries Service and the U.S. Fish and Wildlife Service will be fully coordinated at all levels of the planning and decision-making processes. Optimum use will be made of the information, data, and expertise of these agencies with the understanding that all are partners in achieving the collective goals of their respective constitutional and statutory authorities.
2. Where Forest Service habitat management or land use decisions are or may be affected by Alaska Department of Fish and Game management programs, the Forest Service and the Department will exchange their concerns and work to develop mutually acceptable solutions. Included will be situations involving siting of aquaculture facilities; user-group conflicts over land management determinations; questions on determination of access and permitted activities, and concentration or dispersal of harvesting pressures; and other instances where wildlife habitat, wildlife resources and land use management are intertwined.
3. The Forest Service recognizes wildlife resources as a major component of the Tongass National Forest and the source of numerous important products, benefits and services. Wildlife resources are to be considered no more or no less important than the other renewable resources of the National Forest
4. Management decisions concerning wildlife habitat will be based on sufficient knowledge, information and data to provide a sound basis for professional judgement.
5. Desirable levels of wildlife will be determined primarily by the Alaska Department of Fish and Game, and wildlife habitat will be determined primarily by the Forest Service, using factors such as: land capability, other resource values, demand, relative abundance, competition with other species, and coordination with other resources and needs. Forest Plans will state wildlife objectives in terms of animal population trends and in terms of amount and quality of habitat needed to meet objectives.
6. Emphasize management for indigenous wildlife species and natural habitat over other wildlife management approaches, except in cases where the Forest Service and the Alaska Department of Fish and Game agree upon other alternatives. Give special consideration to the habitat of sensitive, threatened and endangered species of plants, animals, and fish. Provide, as needed, for the identification, habitat management, and protection of these species.
7. The Forest Service designates as wildlife habitat, areas of land and water necessary for the maintenance of wildlife populations at the desirable levels established in policy 5 above.
8. Unless otherwise indicated, determinations necessitated by the policies in this section will be undertaken through the interdisciplinary planning team (IDT) process in full accordance with the policies and procedures for IDT's set forth in the Southeast Alaska Guide.

Land Management Plan Phase

(a) An IDT will assist in land allocation decisions by providing sufficient information to permit allocations which recognize the capabilities and sensitivities of important wildlife habitat areas. Of special importance will be identification of areas which warrant special designation because of their relatively high vulnerability to

development impacts on productive capacity, associated recreational opportunities or other factors.

(b) In addition, the Forest Service recognizes that, for many wildlife species, information on the impacts of land use activities on habitat and on factors determining the suitability of habitat for wildlife is incomplete. During the development of the land management plan, the Forest Service will identify jointly with the Alaska Department of Fish and Game those species for which land use activities should proceed with caution.

(c) The Forest Service recognizes the importance of wildlife habitat, and timber harvesting will be planned to protect or enhance that habitat. Habitat guides, which could protect or enhance the various species, will be jointly developed by the Forest Service and Alaska Department of Fish and Game. Existing information shall be utilized until such guides are prepared.

An IDT will design impact assessment programs, to be carried out concurrent with land use activities, to supply the necessary data and information on the relationship between such activities and habitat requirements.

(d) The Forest Service further recognizes the possibility that alteration of wildlife habitat through a series of projects over an entire range of a species may result in cumulative or collective adverse impacts on those species which escape notice during, or cannot be adequately dealt with through, individual implementation plans. An IDT will provide assistance during the allocation phase to insure that this possibility is adequately protected against.

(e) At the prescriptive and implementation planning levels, the IDT will be utilized as described in the succeeding policies.

9. All proposals for land use (e.g., logging, hydroelectric projects, developed recreation facilities or transportation corridors proposed by other agencies) will require the completion of a prescriptive or implementation plan, with the participation of an IDT. The plan will specify: (1) appropriate Wildlife Habitat Management Units (WHMU's) and (2) prescriptions necessary to meet the goals for wildlife habitat set forth in this section of the Guide. Mineral development activities require an operation plan that also involves the IDT process.

   a. The WHMU will consist of all components of wildlife habitat meeting the definition in policy -- as identified by the IDT process. Other land use activities will not be excluded from WHMU's provided they are consistent with the management goals for wildlife habitat.

   b. The IDT process will also develop localized management and protection prescriptions based upon the characteristics and sensitivities of the area. Participation in prescription development will be invited from the Alaska Department of Fish and Game, the U.S. Fish and Wildlife Service, and the National Marine Fisheries Service. The prescriptions will provide for protection and enhancement of sufficient winter and summer range, browse and food sources, protective cover and migration corridors, nesting, feeding and resting sites. Other requirements necessary to meet the management goal for wildlife habitat will be met over the long run in view of relationships between logging and other land use activities and wildlife habitat needs. The prescriptions will also address the relative need to preserve mature and old-growth forests; to insure sufficient browse reproduction in second-growth stands; to avoid population decreases below predetermined levels as a result of displacement during forest development; to recalculate

rotation periods or other silvicultural practices based on wildlife habitat needs; and to specify the percentage of an area to be cut during a given entry.

c. The prescriptions for all WHMU's will include the following unless more restrictive measures are prescribed by the IDT process:

(1) Wildlife habitat requirements can be partially met through the size, shape, location and dispersal of cutting units, areas retained in natural conditions, silvicultural systems, and multiple-entry harvesting.

(2) Identification of existing or potential opportunities for viewing and photography.

(3) Provision for insuring that a maximum number of snags are retained for wildlife use consistent with the objectives for particular species, aesthetic values and Federal Occupational Safety and Health Act (OSHA) standards.

(4) Tracked vehicle and truck operations within waterfowl habitat, where permitted, shall be confined to constructed roads except in the case of beach salvage operations. Such activities shall be situated behind a timber screen where possible

10. Specific developments and activities such as log transfer points, ferry terminals and camps should be located outside WHMU's where desirable. If the IDT process determines, they may be permitted within a WHMU without contravening management goals, they should be placed in areas where the least disturbance or interference to wildlife will result. Specific protective measures shall be developed by the IDT process for each development and activity.

11. The national significance of the bald eagle dictates that its habitat will continue to be given special protection through specific Forest Service management measures developed in conjunction with the Fish and Wildlife Service. These include:

a. Maintaining the desired quality and quantity of eagle habitat, nest trees and perch trees.

b. Assisting the Fish and Wildlife Service in conducting surveys and studies.

c. Establishing an undisturbed wildlife habitat zone of 100 meters (330 feet) or more in radius around each eagle nest tree prior to any forest development activity in the vicinity. Local topography, timber type, windfirmness and other factors will determine the exact boundaries.

d. The Forest Service, the Fish and Wildlife Service and the Alaska Department of Fish and Game will review the existing policies for bald eagle protection to determine their adequacy and any new measures necessary to carry out the provisions of the Act by the time the Land Management Plan is completed.

12. Users of National Forest lands will be advised of the potential dangers of bear-human confrontations. Procedures for the disposal of garbage and other attractive nuisances at developed areas will be formulated in detail and strictly enforced by Forest Service administrators. Logging camps and other developed sites are to be located away from areas of substantial bear density (including areas around salmon streams frequented by bears) to reduce chances of bear-human confrontations.

13. Certain species shall be selected as indicators of the effects of management.

a) Describe in Forest Plans the anticipated effect on the wildlife resource, the species selected for management and monitoring purposes, the reasons for

selecting the species, the monitoring schedule, and the expected precision and accuracy of the monitoring process.

b) Utilize the following criteria to select species as indicators of the effects of management, keeping in mind the need to restrict species to a practicable number:

1) Threatened or endangered species on Federal lists;
2) Species identified in State lists of endangered or threatened species;
3) Species for which the planning area comprises a majority of the species total Statewide, Regional, or National habitat;
4) Species that represent or reflect environmental suitability for other species (true ecological indicator);
5) Species having significant economic value. Normally these species are those commonly hunted or trapped, and those for which there is a relatively high demand (consumptive and nonconsumptive).

c) Forest Plans shall provide for diversity of plant and animal communities and tree species consistent with the overall multiple use objectives of the planning areas.

14. The Forest Service will insure that land use activities in or affecting Wildlife Habitat Management Units (WHMU's) are carried out in full compliance with applicable plans and policies. Policies will be stipulated in appropriate contracts. Where significant violations or instances of damage or unforeseen problems occur, whether reported by Forest Service personnel or other agencies or individuals, the following remedial steps will be taken:

a. All agencies having responsibilities in the area of concern will be immediately informed by the Forest Supervisor that a problem situation has arisen. Specialists and the individuals with expertise applicable to the problem will also be contacted as soon as possible and brought to the scene if they may be of assistance.

b. If the situation arises in conjunction with a contracted or permitted activity, appropriate officers or individuals will be instructed to take immediate remedial action the full limits of the contract or permit to protect the environment, to repair any damage, and to prevent any further recurrence. If it appears that the problem has arisen from a misassessment of the physical characteristics of the area, operations in the area will be suspended until an investigation by specialists is conducted. The Forest Supervisor shall require that the contractee or permittee inform him of remedial measures which are within their capability and the time required to bring them into operation. concurrently, the Forest Service will undertake all measures to protect and repair the environment which are within the capability of the contractee.

c. In the event the contractee or permittee fails to take corrective measures within its contract or permit responsibility, the Forest Service shall terminate operations in the area until there is compliance.

d. Where available as a remedy, restitution for impairment of habitat productivity will be sought in cooperation with other State and Federal agencies.

e. Corrective measures shall be undertaken in consultation with a group of experts convened by the Forest Supervisor from the Forest Service, and the State and Federal agencies. Once resolution of the problem has been accomplished, the groups will meet with the U.S. Forest Service

staff to determine if additional policies and prescriptions need to be written for preventing recurrences, to identify the cause, and to refine procedures for dealing with such situations.

f. The Forest Supervisor shall develop and maintain a standard contingency plan for dealing with damage situations involving wildlife habitat.

g. All actions by the Forest Service shall insure that the wildlife habitat is returned to its previous condition as soon as possible. In the event of damage, a long-term plan for restoration and prevention of further or recurrent damage shall be developed if there is any potentiality for prolonged or recurring damage.

h. The Forest Service will undertake modification of timber sale and other contract and permit provisions to make available an optimum range of authorities and remedies for dealing with instances of wildlife habitat damage.

In addition to these 14 standards and guidelines, the Tongass Land Management Plan provided for the allocation of lands to four land use designations (referred to as LUD's) which emphasized various resource management opportunities. This land allocation process resulted in the following direction for wildlife resources: A wildlife task group rated each of the 867 value comparison units (VCU's) for their wildlife value (TLMP Wildlife Task Force Working Report, undated). Forty percent of the 298 VCU's rated highest for wildlife at the time were allocated to LUD 1 and LUD 2, with 60 percent allocated to LUD 3 and LUD 4.

To help lessen the impact of logging on old growth dependent wildlife species in LUD 3 and LUD 4 lands, 273,000 acres of commercial forest land were to be retained (not harvested) during the timber rotation. An additional 244,000 acres of commercial forest land were to be managed under extended timber harvest rotations of up to 200 years. These 517,000 acres collectively became known as retention acres. In general terms, LUD 3 areas were to allow an average of 30 percent of the operable old growth to be retained, and LUD 4 areas were to allow an average of 13 percent of the operable old growth to be retained. TLMP did not identify the location of the retention acres: this job was to be accomplished during management area NEPA analysis and project NEPA analysis.

TLMP estimated the following effects on deer winter habitat, bald eagles and brown bear:

1) A total of 4,146,400 acres of deer winter habitat was identified on the Tongass National Forest. About 2,873,000 acres (69 percent) were estimated to remain unharvested at the end of the timber harvest rotation in 2079.
2) Bald eagle populations were estimated to remain stable.
3) Brown bear populations were estimated to remain stable.

Additional analysis and outputs for wildlife were not included in TLMP due to a lack of adequate information on habitat productivity and its relation to wildlife populations (Tongass Land Management Plan Evaluation Report, 1984).

RESULTS OF TLMP IMPLEMENTATION

Of the 273,000 acres of retention to be identified in management area NEPA analysis and project NEPA analysis, about 32 percent had been identified by 1985, and 55 percent by 1987 (Status of the Tongass National Forest, 1985 Report and 1987 Report).

In 1983, the Alaska Department of Fish and Game requested that an additional 72 high-value wildlife and fish habitat areas be deferred from timber harvest until the Forest Plan was revised. Consideration was given to this request during the

amendment of the Forest Plan in 1985. Where program flexibility permitted, scheduling of timber harvesting was deferred in 49 of the high-value areas until the next periodic review of management activities.

The amount of timber harvest occurring on deer winter range has been less than anticipated in TLMP due to depressed timber markets in the mid-1980's. Deer populations, length of hunting seasons, number of deer hunters, and bag limits have generally increased throughout the Tongass National Forest. Mild winter weather has been one factor influencing these increases. Road access from timber management activities has also been a factor in hunter number increases in several areas.

The bald eagle population has increased from an estimated 10,000 adult birds in the early 1980's to an estimated 12,000 adult birds in 1987 (U.S. Fish and Wildlife Service, Phil Schempf, personal communication).

The brown bear population has remained stable throughout its range on the Tongass, except for concerns for the population on the northeast portion of Chichagof Island. In this area, there has been increased brown bear mortality from hunting and human bear conflicts associated with camps, towns and garbage. In 1988, the Board of Game closed the brown bear hunting season on northeast Chichagof.

The Tongass National Forest, the Alaska Region, and Forestry Sciences Lab worked on a second-growth management program through the 1980's to gain information on possible techniques to improve second growth as wildlife habitat. Most of the work has dealt with thinning second-growth stands to prolong the presence of understory forbs and shrubs which are important as forage for many species (such as deer and bear), and thinning older stands to see if this would promote the establishment and growth of understory forbs and shrubs. In November 1988, the Region held a Second-Growth Management Workshop to summarize current knowledge, develop management guidelines to guide future second-growth management, and identify knowledge gaps, monitoring and research needs.

Table 3-229 summarizes the wildlife habitat improvement work accomplished on the Forest from 1979 through 1989. The Forest completed 20,927 acres of habitat improvement and 77 structures were developed for habitat improvement.

TABLE 3-229
SUMMARY OF WILDLIFE HABITAT IMPROVEMENT WORK ACCOMPLISHED FROM 1979 THROUGH 1989.

	Ketchikan Area	Stikine Area	Chatham Area
Acres of slash disposal	2,132	90	20
Acres of precommercial thinning and corridor treatments (some slash disposal will also be included with this work)	10,903	2,186	425
Acres of canopy gaps created	2,480	480	
Acres of partial cutting (uneven-aged management)		40	10
Acres prescribed burning following timber harvesting	1,502		88
Acres of estuarine burns		122	
Acres of alpine fertilization	125		
Acres of reseeding roads	50		10
Acres of grass and clover seeding		23	10
Acres of cottonwood, dogwood, willow planting		191	
Acres of browse improvement (treatments to induce new sprouting and growth)			40
Number of deer exclosures built		8	
Number of waterfowl nest structures	10		59

Source: Data from the Area Fish and Wildlife Staffs.

OPPORTUNITIES AND CONCERNS

More research is needed to gain an understanding of small mammal populations, distributions, taxonomic status and habitats throughout the Forest. With increased understanding, active management may be able to help with the dispersal and viability of small mammals, or management could help ensure the isolation and maintenance of unique subspecies.

There is concern that the estimates on the amount of deer winter range remaining unlogged at the end of the timber rotation will be much less than estimated in TLMP. There is also concern that logging is removing the high volume winter range stands at a faster pace than it is the lower volume stands. However, both the high-volume stands and the low volume stands have been harvested at lower rates than predicted in TLMP.

There is a need for additional research and inventories for most raptors.

The distribution and abundance of species and habitats throughout the numerous islands comprising the Tongass is a concern. Through the use of GIS, there is an opportunity for increased understanding of the habitats occurring on the small islands.

The State of Alaska has identified the need for cumulative effects analysis on the wildlife resources which covers the time period from the 1950's through the end of a timber rotation (100 - 120 years). With the GIS, there is an opportunity to conduct such an analysis with some broad assumptions for the 1950 forest stand conditions and future levels and types of timber harvests.

There is an opportunity to compile and display the increased knowledge pertaining to the wildlife resources on the Tongass National Forest. With this increased knowledge, there is an opportunity to more fully describe and predict habitat conditions and population trends with various management alternatives.

The GIS should provide an opportunity for refined acreage estimates for the habitats of the Management Indicator Species, and for old-growth habitats.

There is an opportunity to implement management standards and guidelines which will provide better coordination and protection for various wildlife habitats such as snags, waterfowl, marine mammals, seabirds, etc.

There is an opportunity to evaluate uneven-aged timber management as compared to the common practice of even-aged timber management, and especially to evaluate the possible effects of using uneven-aged management on the wildlife resources.

There is an opportunity to describe existing habitat conditions for 50 geozones in greater detail than has been done in the past. In conjunction with this, there is opportunity to describe the distribution and abundance of 13 wildlife Management Indicator Species in relation to the 50 geozones given the habitat relationships described in the MIS models. And, there is opportunity to monitor the habitats and populations on a geozone basis.

CHAPTER 4
MANAGEMENT AREA PRESCRIPTIONS

CHAPTER 4 - MANAGEMENT AREA PRESCRIPTIONS

PURPOSE OF MANAGEMENT AREA PRESCRIPTIONS

One of the primary purposes of a Forest Plan is to allocate land within the Forest to the different management area prescriptions.

Definition

The NFMA Regulations (09/30/82) define management area prescriptions as: "Management practices and [management] intensity selected and scheduled for application on a specific area to attain multiple use and other goals and objectives."

Each management area prescription is a strategy for managing the resources of an area of land. Each management area prescription used in the Forest planning process is made up of compatible management practices. These practices are specific actions or treatments that address issues or concerns and the requirements of law and policy.

Management area prescriptions are the same for all alternatives; however, alternatives may differ in the distribution and number of acres allocated to each management area prescription.

Each alternative is composed of a different mosaic of management area prescriptions which cover the entire Forest. Each Environmental Impact Statement alternative will be accompanied by a map with land allocations.

ROLE OF MANAGEMENT PRESCRIPTIONS IN THE REVISION

The Forest Plan and its management area prescriptions define the range of activities that are permitted on a specific piece of land. The Forest Plan does not make any site-specific decisions. Site-specific decisions are made during actual project level analysis. The management area prescriptions do not require the scheduling or implementation of any activity, they only define the array of activities that are permissible. Project level analysis and decisions are what actually determine the precise activities that will be undertaken. Project analysis will be tiered to the Forest Plan and its management area prescriptions. The Forest Plan provides ideas for the land management emphasis on a particular piece of land, and will help guide those types of projects to be prescribed. The management area prescriptions provide general guidance for projects to be considered, activities which can be utilized, and standards/guidelines which must be followed.

RELATIONSHIP BETWEEN LUD'S AND MANAGEMENT AREA PRESCRIPTIONS

The following discussion details the relationship between the Land Use Designations (LUD's) developed for the 1979 Tongass Land Management Plan (TLMP) and the Management Area Prescriptions developed for the Revision. The original TLMP planning direction called for a three-part hierarchical approach to the development of interrelated planning documents. The three decision points were described as follows:

Land Allocation — 1. The Tongass Land Management Plan is the land allocation decision. It defined where combinations of land use opportunities could be made available on the Forest.

Prescriptions — 2. Prescriptions for the TLMP Management Areas were written to define how planned management activities and uses associated with land allocation are to be coordinated and controlled.

Implementation — 3. Prescriptions are followed by project plans for implementation which guide the use of land within Management Areas in accordance with the intent of land allocations and related prescriptions.

VALUE COMPARISON UNITS (VCU's) AND LAND USE DESIGNATIONS (LUD's)

The Forest Plan used a common set of areas for inventorying and interpreting resource values. The Forest was divided into 867 Value Comparison Units (VCU's). A VCU is generally a distinct geographic area that encompasses a drainage basin containing one or more large stream systems (VCU's average about 18,000 acres). Boundaries usually follow easily-recognizable watershed divides. The VCU delineations encompass all resources of a specific area rather than emphasizing single resources.

LUD Definition

Each VCU was placed into one of four Land Use Designations (LUD's). Each Land Use Designation has a common purpose and management implication which describes how the land should be used (see further definitions in the glossary). A brief definition of individual LUD's follows:

LUD I	Wilderness Areas managed as directed by the 1964 Wilderness Act.
LUD II	Roadless lands to be managed to retain their wildland character.
LUD III	Land to provide a combination of commodity and amenity values.
LUD IV	Land to be intensively managed for commodity or market resources.

The TLMP is primarily a land allocation document. The major decision documented in this Plan was the allocation of the various (mapped) Value Comparison Units (VCU's) to one of the four Land Use Designations (LUD's). Associated with each LUD, land use opportunities were made available to Forest users during the life of the Plan.

COMPARISON OF TLMP TO THE REVISION

The Tongass Land Management Plan summarized the resource values, listed above, into Value Comparison Units. Management emphasis was then assigned to a VCU or combination of VCU's by allocating that land area to a specific Land Use Designation (LUD).

Land allocations in the Revision are very similar, but instead of summarizing these by VCU's that are allocated into one of the four LUD categories, the Revision will specify the management area prescription location. The management area prescription location will vary by alternative, but each acre on the Tongass National Forest will always be covered by one of the 23 Management Area Prescriptions described in this document.

The primary difference between TLMP and the Revision is the requirement that both land allocation and standards and guidelines be included in the Revision as opposed to just the land allocation required by TLMP. To do this, more of the issues will be addressed at the Forest Plan level rather than deferring many of the decisions to the project level. This requires that management area prescriptions in the Revision be described in much greater detail than the Land Use Designations (LUD's) described in TLMP.

DESCRIPTION OF THE MANAGEMENT AREA PRESCRIPTIONS

Twenty-three different management area prescriptions are proposed to be analyzed and were specifically developed to insure that the Forest could adequately address the issues raised by the public. These prescriptions represent a wide range of allocation choices for managing specific areas of the Forest. These prescriptions allow varying degrees or resource development, from wilderness (no

land disturbing activities) to full commodity development (intensive clearcuts; or mining). These management area prescriptions will be applied in differing amounts and locations during the development of alternatives. By providing a wide range of prescriptions, it is ensured that a wide range of alternatives can also be produced. A brief description of each Management Area Prescription is listed below.

01 Wilderness - Provide for the protection and continuation of essentially primitive conditions in areas recommended or designated as National Wilderness. Only traditional subsistence use and recovery of beach logs is permitted. Roads are not permitted. Mineral entry is limited to existing, valid claims.

02 National Monument Wilderness - Provide management direction for Admiralty Island and Misty Fiords National Monuments. Only activities such as traditional subsistence use and recovery of beach logs is permitted. Roads are permitted only for mining related purposes. Mineral entry is limited to existing, valid claims.

03 National Monument Nonwilderness - Provide management direction for nonwilderness portions of Admiralty Island and Misty Fiords National Monument. Only activities such as traditional subsistence use and recovery of beach logs is permitted. Roads are permitted only for mining related purposes and are closed to public use. Mineral entry is limited to existing, valid claims.

04 Research Natural Area - Provide important ecological areas designed for research and education and/or to maintain natural diversity on National Forest System lands. Current natural conditions are maintained insofar as possible. No timber harvest will be located outside these areas. Mineral entry is limited to valid, existing claims.

05 Primitive Recreation - Provide recreation opportunities and experiences in unroaded areas outside Wilderness. Timber harvesting is limited to insect and disease control. Roads are permitted only for mining related purposes. Mineral entry is permitted with minimum impact access and operating methods.

06 Old-Growth Habitat - Maintain old-growth conifer habitat in its natural condition to benefit old-growth dependent fish and wildlife resources. Timber harvesting will not be scheduled and roads will be located outside the area when possible. Mineral entry is permitted with minimum impact access and operating methods.

07 Beach Fringe Habitat - Manage for natural beach fringe habitat including windfirm, old-growth conifer habitat, estuary areas, cliffs, and beaches above the mean high-tide line. Timber harvesting is limited to catastrophic events and uneven-aged management if it will encourage development of old-growth habitat characteristics. Roads not associated with log transfer facilities will be located outside the area when possible. Mineral entry is permitted with minimum impact access and operating methods.

08 Enacted Municipal Watersheds - Manage the areas of enacted municipal watersheds to meet the State of Alaska's Water Quality Standards for domestic use. No timber harvesting will be scheduled, but infested and diseased timber may be removed under conditions which safeguard the quantity and quality of water. Roads will be limited to those necessary to administer the municipal watershed. Mineral entry is limited to existing, valid claims.

09 **Experimental Forests** - Establish and manage designated Experimental Forests to provide a variety of long-term opportunities for Forest research and demonstration areas essential to managing forest resources. Timber harvesting will occur only for research and demonstration purposes. Roads will be developed to facilitate and interpret on-going research. The areas may be withdrawn from mineral entry subject to existing, valid claims.

10 **Scenic Viewshed** - Provide scenic landscapes by managing activities so they are not obvious when the landscape is viewed from land or marine travel routes, recreation sites, popular bays and anchorages and small plane recreation routes. Timber harvesting is limited by the landscape's ability to visually absorb such activity. Roads will be designed to be compatible with the landscape. Mineral entry is permitted.

11 **Semi-primitive Motorized Recreation** - Provide recreation opportunities for activities such as snowmobiling, high-clearance vehicle driving or use of all terrain vehicles, motorcycling on trails and primitive roads and areas designated appropriate for these activities; and the use of small motorboats on remote lakes and streams. Timber harvesting is allowed with priority to maintain or improve wildlife habitat and forage native to the area. Roads are located and designed to expand and improve access to semi-primitive recreation opportunities within the area. Mineral entry is permitted with minimum impact access and operating methods.

12 **Roaded Natural/Rural Recreation** - Provide recreation opportunities associated with both motorized and non-motorized activities such as driving for pleasure, viewing scenery, picnicking, fishing, beachcombing, snowmobiling, hiking, and cross-country skiing. Timber harvesting is allowed with priority to maintain existing recreation sites and protect proposed sites. Roads are permitted. Mineral entry is permitted with minimum impact access and operating methods.

13 **Visual-Timber** - Provide a combination of visual and timber opportunities with visual resource opportunities receiving the greatest emphasis. Timber harvesting and roads are permitted while meeting visual quality objectives of the area. Mineral entry is permitted.

14 **Timber-Wildlife** - Provide a combination of timber and wildlife habitat management opportunities with a strong emphasis on wildlife considerations. Snag management will be emphasized. Timber harvesting may include clearcutting and selective cutting with units being dispersed over the harvest area. Roads are permitted while meeting wildlife considerations. Mineral entry is permitted

15 **Timber Production** - Manage the area to maintain and promote industrial wood production. These lands will be managed to develop favorable conditions for the timber resource and for maximum long-term timber production. Roads and mineral entry are permitted.

16 **Wildlife-Timber** - Provide a combination of wildlife habitat and timber management opportunities. Wildlife habitat will be maintained by deferring large blocks of old growth from harvest in the near-term and by scheduling timber harvest in large cutting units. At any point in the harvest schedule, there will be large continuous blocks of old growth maintained for wildlife habitat. Roads are permitted while meeting wildlife considerations. Mineral entry is permitted

17 **Minerals** - Encourage and provide for the exploration and development of mineral resources, while meeting management requirements for other resources. These areas have high potential for the development of any mineral commodity or moderate to high potential for the production of strategic and critical mineral commodities. Timber harvesting may be coordinated with mining activities. Roads are permitted and may be closed to public use.

18 **Riparian Management Requirement** - Meet the minimum riparian management requirements for fish habitat and water quality, as defined by the National Forest Management Act's implementing regulations. Timber harvesting will be allowed where not in conflict with protecting riparian-dependent resources. Roads will be located outside the area when possible. Mineral entry is permitted.

19 **Stream and Lake Protection** - Exceed minimum riparian management requirements for fish and other dependent resources. Timber harvesting is allowed where not in conflict with protecting riparian dependent resources. Roads will be located outside the area to the extent practicable. Mineral entry is permitted.

20 **Special Areas** - Provide for the inventory, maintenance, interpretation, and protection of characteristics of areas with archeological, historical, Native American religious, scenic, geological, botanical, zoological, paleontological or other special features which qualify them for designation, or consideration for designation, as unique within the National Forest. No timber harvest is scheduled and roads will not be permitted unless compatible with management objectives. The areas may be withdrawn from mineral entry if inconsistent with the objectives for which the Area was established.

21 **Wild Rivers** - Maintain and enhance the outstandingly remarkable characteristics of river segments which qualify the river to be considered a Wild River. Timber harvesting is limited to insect and disease control. Roads generally are not present and mineral entry is subject to regulations prescribed by the Secretary of Agriculture to protect the river.

22 **Scenic Rivers** - Maintain and enhance the outstandingly remarkable characteristics of river segments which qualify the river to be considered a Scenic River. Timber harvesting is limited by the ability of the landscape to visually absorb the activity. Roads will be designed to be compatible with the landscape. Mineral entry is subject to regulations prescribed by the Secretary of Agriculture to protect the river.

23 **Recreation Rivers** - Maintain and enhance the outstandingly remarkable characteristics of river segments which qualify the river to be considered a Recreation River. While timber harvesting is allowed, priority is to maintain existing recreation sites and protect proposed sites. Roads are permitted and mineral entry is subject to regulations prescribed by the Secretary of Agriculture to protect the river.

COMPARISON OF MANAGEMENT AREA PRESCRIPTIONS AND AND LAND USE DESIGNATIONS (LUD)

Table 4-1 illustrates the comparison of Management Area Prescriptions and Land Use Designations. The first column lists the four Land Use Designations (LUD's) used in the 1979 Tongass Land Management Plan. The second column shows those Revision management area prescriptions which are compatible with each LUD

NOTE: The comparisons listed in the table between LUD's and proposed management area prescriptions represents an approximate correlation between the two. Unfortunately, in some cases, a precise comparison cannot be made. Therefore, this table is shown for information purposes only, and should not be considered as representing all conceivable relationships between the two sets of prescriptions.

SUMMARY COMPARISON OF THE MANAGEMENT AREA PRESCRIPTIONS

These twenty-three different management area prescriptions represent a wide range of different methods for managing the Forest and are used in the development of various alternatives. In order to better understand some of their differences and similarities, table 4-2 was developed.

TABLE 4-1

COMPARISON OF LAND USE DESIGNATIONS TO MANAGEMENT AREA PRESCRIPTIONS

1979 TONGASS LAND MANAGEMENT PLAN LAND USE DESIGNATIONS	REVISED TONGASS LAND MANAGEMENT PLAN MANAGEMENT AREA PRESCRIPTIONS
	01 Wilderness
LUD I	02 National Monument Wilderness
	03 National Monument non-Wilderness
	04 Research Natural Areas
	05 Primitive Recreation
	17 Minerals
	21 Wild Rivers
	22 Scenic Rivers
	04 Research Natural Areas
LUD II	05 Primitive Recreation
	06 Old-Growth Habitat
	07 Beach Fringe Habitat
	08 Enacted Municipal Watersheds
	17 Minerals
	20 Special Areas
	21 Wild Rivers
	22 Scenic Rivers
	23 Recreation Rivers
	06 Old-Growth Habitat
	07 Beach Fringe Habitat
	09 Experimental Forest
LUD III	10 Scenic Viewshed
	11 Semi-primitive Motorized Recreation
	12 Roaded Natural/Rural Recreation
	13 Visual-Timber
	16 Wildlife-Timber
	14 Timber-Wildlife
	15 Timber Production
	17 Minerals
	18 Riparian Management Requirement
	19 Stream and Lake Protection
	22 Scenic Rivers
	23 Recreation Rivers
	06 Old-Growth Habitat
	07 Beach Fringe Habitat
	09 Experimental Forest
LUD IV	10 Scenic Viewshed
	13 Visual-Timber
	15 Timber Production
	17 Minerals
	18 Riparian Management Requirement
	19 Stream and Lake Protection

TABLE 4-2

SUMMARY COMPARISON OF MANAGEMENT PRESCRIPTIONS

#	MANAGEMENT AREA PRESCRIPTION	VISUAL QUALITY OBJECTIVE	RECREATION OPPORTUNITY SPECTRUM	ACCESS	FISHERIES ENHANCEMENT	TIMBER MANAGEMENT	ROADS	WILDLIFE HABITATS	MINERAL LOCATION & LEASING	RIPARIAN AREAS
01	Wilderness	Preservation, Retention	Primitive, Semi-Primitive Motorized and Non-Motorized	Open for Traditional Access	Designed to be Compatible with Wilderness Objectives	Not Suitable, Beach Log Salvage	None	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Rights	Maintained or Enhanced
02	National Monument Wilderness	Preservation, Retention	Primitive, Semi-Primitive, Motorized and Non-Motorized.	Open for Traditional Access	Designed to be Compatible with Monument Wilderness Objectives	Not Suitable, Beach Log Salvage	None	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Maintained or Enhanced
03	National Monument Non-Wilderness	Retention, Partial Retention, Modification, Maximum Modification	Primitive, Semi-Primitive, Motorized and Non-Motorized, Roaded Natural, Roaded Modified	Open for Traditional Access	Designed to be Compatible with Monument Non-Wilderness Objectives	Not Suitable, Beach Log Salvage	Special Roads and Trails	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Existing Rights	Generally Maintained or Enhanced
04	Research Natural Areas	Retention	Primitive, Semi-Primitive Motorized and Non-Motorized	Open, Restricted	Allowed if Compatible With RNA Objectives	Not Suitable	Special Roads Only	Natural Distribution and Abundance of Habitats	Withdrawn Subject to Valid Rights	Maintain or Enhance
05	Primitive Recreation	Retention	Primitive	Open For Traditional Access	Designed to be Compatible with Recreation Objectives	Not Suitable	None	Natural Distribution and Abundance of Habitat	Open	Maintained or Enhanced
06	Old Growth Habitat	Retention	Primitive, Semi-Primitive Motorized and Non-Motorized	Open for Traditional Uses	Allowed	Not Suitable	Special Roads	Old Growth Habitat Maintained	Open	Maintained or Enhanced

#	MANAGEMENT AREA PRESCRIPTION	VISUAL QUALITY OBJECTIVE	RECREATION OPPORTUNITY SPECTRUM	ACCESS	FISHERIES ENHANCEMENT	TIMBER MANAGEMENT	ROADS	WILDLIFE HABITATS	MINERAL LOCATION & LEASING	RIPARIAN AREAS
07	Beach Fringe	Retention, Partial Retention	Semi-Primitive Motorized and Non-Motorized	Open	Allowed	Not Suitable, Second Growth Management if Previously Harvested	Special Roads	Natural Distribution and Abundance of Beach Fringe Habitat	Open	Maintained or Enhanced
08	Enacted Municipal Watersheds	All	All	Open, Restricted	Generally Inconsistent	Not Suitable	Special Roads Only	Natural Distribution and Abundance of Habitats	Withdrawn Subject to to Valid Rights	Maintain or Enhance
09	Experimental Forest	All	All	Open, Restricted	Allowed	Not suitable, Range of Harvesting Varies with Research Need	Full Transportation Network	Habitats Vary Depending Upon Research Activities	Open	Generally Maintain or or Enhance
10	Scenic Viewshed	Retention, Partial Retention	All	Open	Designed to be Compatible with Visual Objectives	Selection, moderate even-aged harvest	Limited Transportation Network	All Ages of Habitat with Slow Reduction of Old Growth	Open	Located in Prescriptions 14 or 15
11	Semi-Primitive Motorized Recreation	Retention, Partial Retention	Semi-Primitive Motorized	Open	Designed to be Compatible with Recreation Objectives	Selection, Moderate Even-aged Harvesting	Limited Transportation Network	All Ages of Habitats with Moderate Reduction of Old Growth	Open	Located in Prescriptions 14 or 15
12	Roaded Natural, Rural Recreation	Modification,	Roaded Natural	Open	Encouraged	Even-aged Management	Full Transportation Network	All Ages of Habitat with Rapid Reduction of Old Growth	Open Access	Located in Prescriptions 14 or 15
13	Visual-Timber	Partial Retention	Roaded Natural and Modified	Open	Allowed	Moderate Even-aged Harvesting	Full Transportation Network	All Ages of Habitat with Slow Reduction Of Old Growth	Open	Located in Prescriptions 14 or 15

#	MANAGEMENT AREA PRESCRIPTION	VISUAL QUALITY OBJECTIVE	RECREATION OPPORTUNITY SPECTRUM	ACCESS	FISHERIES ENHANCEMENT	TIMBER MANAGEMENT	ROADS	WILDLIFE HABITATS	MINERAL LOCATION & LEASING	RIPARIAN AREAS
14	Timber-Wildlife	Retention, Partial Retention, Modification,	Roaded Natural and Modified	Open	Allowed	Moderate Evenaged Harvesting	Full Transportation Network	All Ages of Habitat with Small Blocks of Old Growth and Harvested Areas	Open	Located in Prescriptions 14 or 15
15	Timber Production	Maximum Modification	Roaded Natural and Modified	Open	Allowed	Intensive Evenaged Harvesting	Full Transportation Network	Early, Middle and Mature Habitats	Open	Located in Prescriptions 14 or 15
16	Wildlife-Timber	Modification, Maximum Modification	Roaded Natural and Modified	Open	Allowed	Intensive Even-aged Harvesting	Full Transportation Network	All Ages of Habitat with Large Blocks of Old Growth and Harvested Areas	Open	Located in Prescriptions 14 or 15
17	Minerals	Maximum Modification	All	Open, Restricted	Allowed	Complete Range of Harvesting	Special Roads	Habitats Vary Depending Upon Mining Actions	Emphasized	Minimize Disturbance
18	Riparian Management Requirement	All	Semi-Primitive Motorized, Rural, Roaded Natural	Open	Encouraged	Selection, Moderate to Intensive Evenaged Harvesting	Special Roads and Trails	All Ages of Habitat with Some Old Growth Maintained	Open	No Serious and Adverse Effects to Water or Fish Habitat
19	Stream and Lake Protection	All	Semi-Primitive Motorized, Rural, Roaded Natural	Open	Encouraged	Selection, Moderate Even-aged Harvesting	Special Roads and Trails	All Ages of Habitat with Majority of Old Growth Maintained	Open	Maintained or Enhanced
20	Special Areas	Retention	Primitive, Semi-Primitive Motorized and Non-Motorized	Open	Allowed if Compatible with Special Areas Objectives	Not Suitable	Special Roads Only	Natural Distribution and Abundance of Habitats	Open with Restrictions	Maintain or Enhance

#	MANAGEMENT AREA PRESCRIPTION	VISUAL QUALITY OBJECTIVE	RECREATION OPPORTUNITY SPECTRUM	ACCESS	FISHERIES ENHANCEMENT	TIMBER MANAGEMENT	ROADS	WILDLIFE HABITATS	MINERAL LOCATION & LEASING	RIPARIAN AREAS
21	Wild Rivers	Retention	Pristine, Primitive	Open for Traditional Access	Designed to be Compatible with Wild River Objectives	Not Suitable Salvage Harvesting	Special Roads	Natural Distribution and Abundance of Habitat	Withdrawn Subject to Valid Rights	Maintained or Enhanced
22	Scenic Rivers	Retention, Partial Retention	Semi-Primitive Motorized and Non-Motorized	Open	Designed to be Compatible with Scenic River Objectives	Selection, Moderate Even-aged Harvesting	Limited Transportation Network	All Ages of Habitat with Slow Reduction of Old Growth	Open	Located in Prescriptions 14 or 15
23	Recreation Rivers	Retention, Partial Retention	All	Open	Designed to be Compatible with Recreation River Objectives	Selection, Moderate Even-aged Harvesting	Full Transportation Network	All Ages of Habitat with Moderate Reduction of Old Growth	Open	Located in Prescriptions 14 or 15

CHAPTER 5
BENCHMARKS

CHAPTER 5 - BENCHMARKS

PURPOSE AND FUNCTION

Benchmarks display the maximum physical, biological, and technical capabilities of the forest. They are not limited by Forest Service policy, budget, discretionary constraints, spatial feasibility, or program and staffing requirements. They are physically and technically, but not necessarily operationally, implementable. The purpose of a benchmark analysis is to explore not only the resource potential and current situation, but also the need for change and the decision space within which change can or must occur. Since benchmarks portray the maximum possible resource potential, they encompass the decision space of feasible alternatives, therefore all alternatives must fall within the range of the benchmarks. Benchmarks thus form a basis for comparing alternatives; for example, one may wish to examine how close a given alternative comes to the maximum timber or fish production outputs, or perhaps how many additional outputs it provides beyond minimum level.

Benchmarks range from maximum resource outputs with no budget limits to minimum levels that include only background outputs and fixed costs associated with maintaining the Forest in federal ownership. This range provides an analytical base for development of alternatives and provides a reference point for comparison of alternatives.

DESCRIPTION OF BENCHMARKS

The following discussion will describe each benchmark and the information provided by its analysis. Table 5-1, following the description of the benchmarks, displays the outputs, cost, and present net value (PNV) of each benchmark. Appendix B further discusses how the benchmarks were modeled and how constraints were applied to meet the description and purpose of the individual benchmarks.

BENCHMARK 1 (MLV)

Minimum Level Management - The purpose of this benchmark is to estimate the costs and values of background outputs that occur regardless of any Forest activities. Minimum level should be thought of as an accounting analysis to determine the residual outputs and fixed costs associated with maintaining the Tongass National Forest. This benchmark is used as a base to compare other alternatives. Because it is only an accounting analysis, the phase-in period that would be needed, if minimum level was actually implemented, was ignored. The main purpose of this benchmark is to illustrate which outputs, costs, and values would occur regardless of any management influences, and to later show which are actually induced by Forest Service activities.

This benchmark results in all commodity outputs on the Forest being reduced to zero (including timber, commercial fish, developed recreation, and minerals). All public and private sector developed recreation facilities on National Forest lands are closed and allowed to deteriorate. Wilderness areas will not be administered or maintained. Their trail structure will be allowed to deteriorate and the only use that will continue to occur will be uninduced dispersed recreation. Dispersed recreation use that cannot be discouraged or controlled will continue to occur. State roads will remain open but most Forest roads will be closed. Cultural resource management would be at a minimum and would be primarily for the protection of cultural properties (especially in conjunction with minerals management or unauthorized recreation activities).

Vegetation will follow natural succession. Habitat capability for management indicator species requiring early and late seral stage habitat will stabilize over time. The timber program would be discontinued. All road development would be halted. The soil and watershed conditions will return to their natural state. Every subsequent benchmark and alternative must at least produce the same outputs as this minimum level benchmark.

BENCHMARK 2 (FLW) **MAX PNV (Timber Policy Constraints Only)** - The purpose of this benchmark is to show the most economically efficient level of resource production with the fewest possible constraints. It also forms the base run that is used in evaluating trade-offs associated with the management requirements (MR's). The only restrictions in this benchmark are a maximum harvest fluctuation of 30 percent per decade and a sustained yield requirement to guarantee enough ending timber inventory to sustain harvest. Given these two restrictions, this benchmark displays the maximum PNV and associated outputs that can be produced regardless of impacts on other resources. It illustrates an economically efficient level of valued resources with the fewest constraints.

BENCHMARK 3 (PNV) **MAX PNV (Management Requirements and Timber Policy Constraints Only)** - This benchmark defines and evaluates management requirements for the Tongass National Forest. It establishes opportunity costs of all management requirements taken collectively when compared to Benchmark 2. When additional constraints are imposed, this benchmark provides the baseline for calculating opportunity costs of those additional constraints. It estimates the mix of resource uses and a schedule of outputs and costs, which maximizes the present net value of the forest, subject to meeting management requirements. Some of the significant findings from this benchmark, which illustrate the most economic solution for the forest, are listed below:

a. The timber harvest level is 580 MMBF annually in the first decade. This is a 29 percent increase over the ASQ in the Tongass Land Management Plan.
b. The long term sustained yield capacity of the Forest is 1,510 MMBF annually. This indicates the long term timber production capability of the Forest is significantly higher than present harvest levels due to the anticipated growth rates on second growth stands.
c. Reforestation is 22,200 acres per year in the first decade. This is a 31 percent increase over the current level. This rate of reforestation will result in 118,300 acres of additional second growth stands over 50 years.
d. No harvest will occur in riparian areas.
f. 200 miles of new roads will be constructed per year during the first decade. All total, 2,000 miles will be constructed during the next 10 years and 10,500 miles during the next 50 years.
g. Recreation and tourism capacity is maintained at 4.2 million visitor days per year in the first decade. Recreation use is anticipated to be 2.8 million visitor days per year during that same time period. This will result in excess capacity of 1.4 million visitor days during the next ten years.
h. Recreation and tourism capacity will continue to be maintained at 4.2 million visitor days per year in the fifth decade. Recreation use is anticipated to also be 4.2 million visitor days per year during that same time period. This will result in no excess capacity being available after 50 years.
i. Brown Bear habitat will be reduced less than 1 percent after the first decade and only 4 percent over the next fifty years.

j. Bald Eagle habitat will be reduced 3 percent after the first decade and 32 percent over the next fifty years.
k. Sitka Black Tailed Deer habitat will be reduced 6 percent after the first decade and 30 percent over the next fifty years.
l. Brown Creeper habitat will be reduced 18 percent after the first decade and 47 percent over the next 50 years.
m. Black Bear habitat will be reduced less than 1 percent after the first decade and 16 percent over the next 50 years.
n. Martin habitat will be reduced 2 percent after the first decade and 20 percent over the next 50 years.
o. Red Breasted Sapsucker habitat will be reduced 4 percent after the first decade and 20 percent over the next 50 years.
p. Hairy Woodpecker habitat will be reduced 8 percent after the first decade and 34 percent over the next 50 years.
q. River Otter habitat will be reduced 4 percent after the first decade and 29 percent over the next 50 years.
r. Red Squirrel habitat will be reduced 2 percent after the first decade and 34 percent over the next 11 years.
s. Salmon habitat will increase for all species over the base year. This increase is due to fisheries improvement projects and results in a 10 percent change from the base year level.
t. Populations of sport fish will remain at sufficient levels to meet the anticipated demand for sport fish.
u. Wildlife populations will remain at sufficient levels to meet the anticipated demand for hunting.
v. 900,000 acres of roadless will be maintained in a natural condition, when existing wilderness areas are included this results in a total of 6.3 million acres being managed for non-comodity resources.
w. The total Forest Service budget needed to implement the benchmark will be 89 million dollars.

BENCHMARK 4 (MKV)

MAX PNV with Market Values (Management Requirements and Timber Policy Constraints Only) - This benchmark estimates the mix of resource uses and provides a schedule of outputs and costs maximizing present net values of those outputs having established market values. Values were removed from the non-market resources for formulation of this benchmark. Only those values for timber, commercial fish, developed recreation and minerals were allowed to affect land allocations and output production levels. The significant findings from this benchmark are listed below:

a. Timber harvest levels increase 10 MMBF from the maximum present net value benchmark. This indicates that non-market resource values do not significantly effect timber harvest levels.
b. No harvest occurs in riparian areas due to the high commercial fish values relative to the net value of timber harvesting.
c. Recreation capacity and use will not change significantly from the maximum present net value benchmark. This indicates that non-market resource values do not have a large impact on the level of recreation and tourism production.
d. Wildlife populations decline at approximately the same rate as in the maximum present net value benchmark. This indicates that non-market resource values do not significantly effect the economics associated with the production of wildlife.
e. Commercial fish are produced at their maximum level since they are considered a market resource.

f. Hunting and fishing are still produced at levels sufficient to meet demand even though the resources are not valued in this benchmark. This indicates there is little economic competition between the production of market resources and hunting and fishing.

g. 5.8 million acres will be managed to maintain their natural setting. These total acres are less than the maximum present net value benchmark results thus indicating that the inclusion of non-market values may influence development decisions.

BENCHMARK 5 (TBR) **MAX Timber for 1 Period (Management Requirements and Timber Policy Constraints)** - This benchmark defines maximum timber output possible for the first decade under current timber management policy constraints and management requirements. If no other resources mattered beyond their minimum tolerable level, this benchmark indicates the maximum timber harvest that could be sustained without economic considerations. Some significant findings from this benchmark are listed below:

a. The maximum timber production level subject to management requirements and timber policy is 780 MMBF per year in the first decade.

b. The maximum long term sustained yield of the Forest subject to management requirements and timber policy constraints is 1,950 MMBF per year. This is much higher than the short term harvest levels due to the existing age class distribution (predominantly older stands) and the anticipated growth rates on regenerated timber stands.

c. This maximum timber production level will require an increase in reforestation from 17,000 acres per year to almost 26,000 acres per year in the first decade.

d. 50 MMBF of timber will be harvested from riparian areas.

e. The maximum amount of timber harvest still produces enough recreation capacity to meet anticipated demand over the next 50 years.

f. The decline in wildlife habitat is accelerated over the amounts listed in the maximum present net value benchmark due to the increased rate of timber harvest. This additional amount of habitat reduction generated by the increased harvest of 200 MMBF ranges from 4 percent for Black Bears to 9 percent for Bald Eagles.

g. The maximum level of timber production will not have any significant change in salmon production due to restrictions on the type of harvest which may occur in riparian areas. Fish production increases since improvement projects, which enhance fish habitat, do not compete with timber production.

h. The harvest levels in this benchmark will produce adequate wildlife and fish populations to meet the anticipated demand for hunting and sport fishing.

i. No additional acres will be managed to maintain their natural setting.

j. This benchmark will require a Forest Service budget of more than 139 million dollars per year for the next decade.

BENCHMARK 6 (TBD) **MAX Timber for 1 Period (Benchmark 5, Less Non-declining Yield)** - This benchmark defines maximum timber outputs possible for the first decade under current policy and management requirements, without non-declining yield (NDY). When compared with Benchmark 5, it illustrates how binding the NDY constraint is on timber production. The results describe the maximum amount of additional timber production that could be achieved under a departure NDY. The significant findings from this benchmark are listed below:

a. A departure from non-declining yield can increase the maximum annual timber production in the first decade from 780 MMBF to 1,150 MMBF. This is an increase of almost 50 percent.

BENCHMARK 7 (TBC) MAX Timber for 1 Period (Benchmark 5, Less Culmination of Mean Annual Increment) - This benchmark defines the maximum timber output possible for the first decade under current policy and management requirements, without culmination of mean annual increment (CMAI). When compared with Benchmark 5, it illustrates how binding CMAI constraint is on timber production. If no other resource mattered beyond their minimum tolerable level, this benchmark indicates the maximum amount of timber that could be sustained without economic considerations or requiring CMAI prior to harvest. Significant findings from this benchmark are listed below:

a. Removal of the requirement not to harvest timber until they have reached 95 percent of mean annual increment will increase the maximum timber harvest level in the first decade from 780 MMBF per year to 850 MMBF, or 9%.

BENCHMARK 8 (WLN) **MAX Wilderness** - This benchmark was designed to evaluate impacts of maximum wilderness allocations. All 106 inventoried roadless areas totaling 10.4 million acres were allocated to wilderness management. No boundary adjustments to roadless areas were allowed, meaning the maximum amounts of unroaded areas were allocated to wilderness allocations. When compared to Benchmark 3, this illustrates the impact of allocating all potential areas to wilderness management. Findings from this benchmark are listed below:

a. A 150 MMBF allowable sale quantity can be produced in the first decade from lands not meeting the criteria for wilderness consideration.
b. Road construction is reduced to 40 miles per year in the first decade. These roads will only be constructed in areas not suitable for wilderness consideration.
c. The decline in all wildlife species is greatly reduced. The declines over the next 50 years range from 2 percent for the Red Squirrel to 14 percent for the Brown Creeper.
d. There will be a slight increase in recreation and tourism capacity, however anticipated use will not increase over the other benchmarks.
e. The Forest Service budget will be reduced to 33 million dollars.

BENCHAMRK 9 (NON) **MAX PNV (No Additional Wilderness)** - The purpose of this benchmark is to evaluate the impacts of no additional wilderness allocations. All 106 roadless areas are allocated to non-wilderness management. When compared to Benchmark 3, the impacts of sending no additional acres to wilderness are illustrated. Significant findings from this benchmark are listed below:

a. Timber harvest levels will be increased 10 MMBF per year in the first decade over the maximum present net value benchmark. This indicates that forcing all available acres into commodity management does not yield significant increases in timber production.
b. The present net value of the Forest will be reduced less 10 million dollars due to the forced commodity management of all available acres.

BENCHMARK 10 (FSH) **MAX Fish** - This benchmark defines the maximum capability of the forest to produce anadromous fish over the planning horizon, subject to management requirements. It also illustrates what other resource production levels are consistent with the maximum fish production level.

a. This benchmark is identical to the maximum present net value benchmark. Maximum fish production is therefore consistent with maximizing present net value. All outputs and costs associated with maximum fish production are the same as those associated with benchmark three.
b. There is no economic tradeoff associated with maximum fish production, due to no economic tradeoffs occurring between timber harvesting and fish production.

c. Since riparian areas were not being harvest in the maximum present net value benchmark anyway, the production of maximum levels of fish has no additional impact on timber harvesting.

BENCHMARK 11 (RCR) **MAX Recreation** - This benchmark defines the maximum capability of the Forest to provide recreation use over the planning horizon, subject to management requirements. It also illustrates what other resource production levels are consistent with the maximum recreation use level.

a. The allowable sale quantity will be 370 MMBF per year in the first decade. This is the economic harvest level associated with maximum recreation production. This is a reduction of 210 MMBF from the maximum present net value benchmark.
No logging will occur in areas of identified recreation use.
b. Recreation capacity in increased to 4,600 thousand visitor days by the end of the fifth decade. The result is excess capacity above demand for the next 50 years.
c. The protection of important recreation use areas from logging and the relatively low harvest level in this benchmark reduces the rate of decline for wildlife species. The decline in wildlife species over the next 50 years ranges from a low of 7 percent for the Red Squirrel and high of 30 percent for the Brown Creeper.
d. Maximum recreation capacity and use has no effect on salmon habitat.

BENCHMARK 12 (RVR) **MAX Rivers** - This benchmark was designed to evalute the impacts of maximum wild and scenic river designation.

THE RESULTS OF THIS BENCHMARK WERE NOT AVAILABLE AT THE TIME OF PUBLICATION.

BENCHMARK 13 (WLD) **MAX Old Growth Wildlife** - This benchmark illustrates what resource production levels are possible if the reduction of habitat for old growth dependent species is limited to one percent. It also defines the maximum capability of the Forest to provide wildlife-related use over the planning horizon, subject to management requirements.

a. The allowable sale quantity will be 40 MMBF per year in the first decade if the reduction of habitat for old growth species is limited to only one percent. This is a reduction of 93 percent from the maximum present net value benchmark, and 91 percent from the current benchmark. This indicates there is a strong relationship between the amount of timber harvest and the reduction of old growth habitat.
b. The opportunity cost associated providing a minimum reduction to old growth habitat is 480 million dollars forest-wide.
c. Less than ten miles of road construction will occur per year for the next forty years.
d. Recreation capacity will increase slightly, but use will remain the same as compared to maximum present net value benchmark.
e. The reduction of habitat for all species will be only 1 percent over the next 50 years.
f. Salmon production will be the same as in the maximum present net value benchmark.
g. The demand for hunting and sport fishing will be met as in the maximum present net value benchmark.
h. The Forest Service budget will be reduced to 20 million dollars per year.

BENCHMARK 14 (NOW) **MAX PNV (Harvest in Existing Wilderness Allowed)** - The purpose of this benchmark is to display the amount of economical timber harvest opportunities which were

foregone due to ANILCA wilderness designations. This benchmark is a duplicate of Benchmark 3 except that the tentatively suitable forest lands within existing wilderness are made available for harvest. When compared to Benchmark 3, this benchmark displays how much of a change in present net value is caused by the wilderness allocation in ANILCA.

THE RESULTS OF THIS BENCHMARK WERE NOT AVAILABLE AT THE TIME OF PUBLICATION

BENCHMARK 15 (NWT)

MAX TIMBER (Harvest in Existing Wilderness Allowed) - The purpose of this benchmark is to display the maximum amount of timber harvest opportunities which were foregone due to wilderness designations in ANILCA. This benchmark is a duplicate of Benchmark 5 except that the tentatively suitable timber lands within existing wilderness are made available for harvest. When compared to Benchmark 5, this benchmark displays how much of a change in total timber harvest was caused by the wilderness allocations in ANILCA.

THE RESULTS OF THIS BENCHMARK WERE NOT AVAILABLE AT THE TIME OF PUBLICATION

BENCHMARK 16 (CUR)

Current Level - This benchmark estimates the effects of maintaining the current level of outputs and services in the future with continuation of the existing land allocations, direction, policies, and practices. This alternative was designed to accurately depict the current operating program on the forest. Significant findings from this benchmark are listed below:

a. The current allowable sale quantity of 450 MMBF per year will be maintained.
b. Reforestation will have to increase to 23,300 acres per year due to lower volume stands being treated.
c. 5 MMBF per year will be harvested from riparian areas.
d. Recreation and tourism capacity will remain constant over the next 50 years and will meet or exceed demand in all time periods.
e. Reductions will occur in wildlife habitat for all species with the largest reductions (over 20%) happening to Bald Eagle, Deer, Brown Creeper, and Hairy Woodpecker habitat. Moderate reductions (10% to 20%) will occur to Black Bear, Martin, Red Breasted Sapsucker, River Otter, and Red Squirrel habitat.
f. Salmon habitat capability will increase for all species.
g. There will be sufficient habitat for fish and wildlife to meet the demand for hunting and sport fishing in all time periods.

Benchmarks with Uneven-aged Timber Management

Benchmarks 17 - 19 are uneven-aged benchmarks developed from the management requirement benchmark (Benchmark 3). They estimate the outputs and environmental effects of various alternative methods of performing uneven-aged timber management. They will later be used to determine which uneven-aged management method will be incorporated into alternatives brought forward in detail in the EIS. Uneven-aged management is defined as the application of a combination of actions needed to simultaneously maintain a continuous high forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products. Harvesting with uneven-aged management is usually regulated by specifying the number or proportion of trees in a particular size class to be retained within each area in order to maintain a planned distribution of size classes. Harvesting methods that develop and maintain uneven-aged stands are group selection and single tree selection. (36 CFR 219.3)

This analysis of uneven-aged management was designed to respond to a number of emerging issues related to forest planning. These issues are:

1. Reducing the number of acres assigned to clearcutting prescriptions.
2. Providing the public with larger trees.
3. Developing a harvest method that is more compatible with non-commodity values such as visual quality, wildlife, diversity, etc.

Since there is no one uneven-aged management regime that can accomplish all the above goals simultaneously, a number of different uneven-aged benchmarks were postulated to explore the different methods of uneven-aged management and/or emphasis of different goals. Descriptions of these benchmarks follow.

BENCHMARK 17 (GRP)

Group Selection - The purpose of this benchmark is to manage all lands previously available for even-aged management, under group selection. This test is designed to reduce the acres assigned to clearcutting prescriptions. This benchmark defines maximum timber output economically possible under group selection (<2 acres) on all lands suitable for timber management subject to management requirements. When compared to Benchmark 3, it displays the change in outputs, effects, and costs associated with using a group selection harvest system rather than clearcutting. Some of the significant findings from this benchmark are listed below.

a. The present net value was reduced 50 million dollars or 2 percent.
b. First decade timber harvest is 480 MMBF per year. This represents a reduction of 100 MMBF per year or 17 percent.

BENCHMARK 18 (BIG)

200 Year Rotation - The purpose of this benchmark is to manage all lands previously available for even-aged management under an extended rotation scenario. This is designed to define the most economically efficient timber output possible with a minimum 200 year rotation age thus providing for maintenance of old growth associated wildlife habitat. This benchmark has all tentatively suitable forest lands available subject to management requirements. When compared to Benchmark 3, it displays the changes in outputs, effects, and costs associated with using a 200 year rotation age rather than a minimum of 95% of culmination of mean annual increment. Some of the significant findings from this benchmark are listed below.

a. Present net value decreased 60 million dollars or 2 percent.
b. First decade timber harvest is 420 MMBF per year. This represents a reduction of 160 MMBF per year or 28 percent.

BENCHMARK 19 (TRE)

Individual Tree Selection - The purpose of this benchmark is to manage all lands previously available for even-aged management under individual tree selection by diameter class. This is designed to define the most economically efficient timber output possible under classical tree selection on all lands suitable for timber management subject to management requirements. When compared to Benchmark 3, it displays the changes in outputs, effects, and costs associated with using individual trees rather than clearcutting.

THE RESULTS OF THIS BENCHMARK WERE NOT AVAILABLE AT THE TIME OF PUBLICATION

Benchmarks for Constraint Analysis

The purpose of constraint analysis is to display marginal cost of each of the management requirements imposed. Benchmarks 20 to 24 are designed to illustrate the trade-offs associated with individual management requirements including: non-declining yield, culmination of mean annual increment, dispersion, viable populations, and riparian protection. Constraint benchmark analysis involves removal of each management requirement constraint from Benchmark 3 to determine

the actual impact of that management requirement. This analysis displays only the marginal impact of the constraint and not that portion caused by overlap with other constraints remaining in the model formulation. The management requirement is then reinstated into the model and a different one is then removed and the process repeated until all of the management requirements have been analyzed. This constraint analysis process provides an indication of the significant constraints and aids in focusing on the most important constraints. The following section displays the specifications for each of the constraint analysis benchmarks.

BENCHMARK 20 (NDY) **Non-declining Yield Analysis** - The purpose of this benchmark is to display the proportion of opportunity costs associated with management requirements that can be attributed to the non-declining yield policy constraint. This benchmark is a duplicate of Benchmark 3 except that the non-declining yield constraint has been removed. When compared to Benchmarks 2 and 3, Benchmark 20 displays how much of the total reduction in present net value caused by the management requirements can be associated with the non-declining yield constraint. Significant findings from this benchmark are listed below:

a. The present net value can be increased 50 million dollars or 2% if non-declining yield is relaxed.
b. The first decade timber harvest can be increased 310 MMBF or 53% if non-declining yield is relaxed.

BENCHMARK 21 (CMI) **Culmination of Mean Annual Increment Analysis** - The purpose of this benchmark is to display the proportion of opportunity costs associated with management requirements that can be attributed to the culmination of mean annual increment (CMAI) constraint. This benchmark is a duplicate of Benchmark 3 except that the CMAI constraint has been removed. When compared to Benchmarks 2 and 3, Benchmark 21 displays how much of the total reduction in present net value caused by the management requirements can be associated with the CMAI constraint. Significant findings from this benchmark are listed below:

a. The present net value can be increased 40 million dollars or 1% if culmination of mean annual increment is relaxed.
b. The first decade timber harvest can be increased 40 MMBF or 7% if culmination of mean annual increment is removed.

BENCHMARK 22 (VPD) **Maintaining Viable Populations Analysis** - The purpose of this benchmark is to display the proportion of opportunity costs associated with management requirements that can be attributed to viable populations constraint. This benchmark is a duplicate of Benchmark 3 except that the viable populations constraint has been removed. When compared to Benchmarks 2 and 3, Benchmark 22 displays how much of the total reduction in present net value caused by management requirements can be associated with the viable populations constraint. The significant findings from this benchmark are listed below:

a. The present net value can be increased 30 million dollars or 1% if viable populations are relaxed.
b. The first decade timber harvest can be increased 70 MMBF or 12% if viable populations are relaxed.

BENCHMARK 23 (RIP) **Riparian Protection Analysis** - The purpose of this benchmark is to display the proportion of opportunity costs associated with management requirements that can be attributed to the riparian constraint. This benchmark is a duplicate of

Benchmark 3, except that the riparian constraint has been removed. When compared to Benchmarks 2 and 3, Benchmark 23 displays how much of the total reduction in present net value caused by the management requirements can be associated with the riparian constraint. The significant findings from this benchmark are listed below:

THE RESULTS OF THIS BENCHMARK WERE NOT AVAILABLE AT THE TIME OF PUBLICATION

BENCHMARK 24 (DSP)

Harvest Unit Dispersion Analysis - The purpose of this benchmark is to display the proportion of opportunity cost associated with management requirements that can be attributed to the dispersion constraint. This benchmark is a duplicate of Benchmark 3 except that the dispersion constraint has been removed. When compared to Benchmarks 2 and 3, Benchmark 24 displays how much of the total reduction in present net value caused by the management requirements can be associated with the dispersion constraint.

a. The present net value will not be increased if the harvest unit dispersion constraint is removed. This constraint has no economic opportunity cost.
b. The first decade timber harvest can be increased 10 MMBF or 2% if the harvest unit dispersion constraint is relaxed.

CONCLUSIONS

This section explains conclusions the Forest reached as a result of the benchmark analysis. It includes discussions of the interactions between benchmarks and what was learned cumulatively from them.

Present net value

1. Present net value is primarily influenced by timber harvest level. The maximum present net value benchmark produces 580 MMBF. As benchmarks produce lower or higher harvest levels the PNV drops.
2. The lowest present net value is produced by the maximum old growth habitat benchmark due to its harvest of only 40 MMBF per year.
3. The maximum timber resource benchmark also produces a low PNV. This is because the harvest level of 780 MMBF requires the use of lands not economically efficient for timber production.
4. The maximum fish production benchmark has no impact on present net value.

Timber Allowable Sale Quantity

1. The most economically efficient timber harvest level is 580 MMBF per year.
2. The allowable sale quantity can be most easily increased by removing the non-declining yield conatraint.
3. Limiting the reduction of old growth wildlife habitat has a dramatic impact on timber harvest levels
4. The current harvest level of 450 MMBF can be sustained over time.
5. The maximum timber harvest level that can be produced without relaxing constraints is 780 MMBF in the first decade.
6. The maximum fish production benchmark has no impact on timber harvest levela.
7. Non-market resource values have only a 10 MMBF effect on timber harvest levels
8. A maximum wilderness allocation will drop the harvest level 430 MMBF or 74 percent.
9. Only an additional 10 MMBF can be economically produced from areas if all lands were allocated to commodity emphasis.
10. Protection of all areas of important recreation use will drop the harvest level 210 MMBF or 36 percent.

Long Term

1. The long term sustained yield capacity of the forest is much greater than

Sustained Yield

the short term harvest opportunities. This is a result of a skewed age class distribution of the Forest towards older stands which are producing no growth. Once these are replaced with young fast growing stands the harvest levels will be able to be increased.

2. The long term sustained yield is dramatically reduced by removing acres from the suitable land base. Those benchmarks which remove significant acres from the possibility of future timber harvest such as maximum wilderness, maximum old growth habitat, and maximum recreation, have the most pronounced reduction of long term sustained yield.

Reforestation

1. The amount of reforestation is directly tied to the timber harvest level. Those benchmarks which have the higher timber harvest levels, also require the higher amounts of reforestation.

Riparian Harvest

1. The most economically efficient harvest level for riparian areas is zero.
2. Only those benchmarks which have an explicit timber harvest level required do any harvesting in riparian areas.

Road Construction

1. The amount of road construction is directly tied to the timber harvest level. Those benchmarks which have the higher timber harvest levels, also require the higher amounts of road construction.
2. The least amount of road construction occurs in the maximum wilderness and maximum old growth habitat benchmarks due to their low timber harvest levels.

Recreation and Tourism

1. There will be sufficient recreation capacity to meet projected demand in all benchmarks. This results in no change in the anticipated amount of recreation and tourism use between any of the benchmarks.
2. In all benchmarks except maximum recreation and maximum old growth habitat, recreation capacity is exactly equal to demand after 50 years. There will not be any excess recreation capacity in these benchmarks after the fifth decade. Maximum recreation and maximum old growth habitat benchmarks will still have a slight amount of excess recreation capacity after 50 years.

Wildlife Habitat

1. Wildlife habitat will decline for all species in all benchmarks (however, only slightly in Benchmark 13), except minimum level management.
2. All listed wildlife species predominantly use old growth habitat. Timber harvest of old growth reduces the amount of old growth left remaining and hence the amount of wildlife habitat.
3. Those benchmarks which have the highest amount of timber harvesting indicate largest rate of decline in wildlife habitat.
4. The Brown Creeper due to its sole use of high volume old growth for wildlife habitat shows the largest decline in all benchmarks.
5. The Brown Bear, Black Bear, and Red Squirrel show the lowest decline across the benchmarks since they utilize some habitat other than old growth timber stands.
6. Bald Eagles, Deer, Pine Martin, Red Breasted Sapsucker, Hairy Woodpecker, and River Otter show moderate declines in all benchmarks.
7. No benchmark reduces any wildlife population below a viable population level.

Salmon Habitat

1. Salmon habitat is maintained or enhanced in all benchmarks.
2. All fisheries improvement projects are constructed in every benchmark with the exception of minimum level management.
3. Management requirements for riparian protection, which are contained in all benchmarks, prevent any serious or adverse impacts to fish habitat in all benchmarks.

	4.	Riparian areas have a higher economic value for fish production than timber harvesting.
Hunting and Fishing	1.	There will be sufficient wildlife and fish populations to meet the anticipated demand for hunting and sport fishing in all benchmarks for the next 50 years. This results in no change in the anticipated amount of hunting and sport fishing between any of the benchmarks.
Maintained Natural Conditions		
Forest Service Cost	1.	Changes in Forest Service costs between benchmarks are directly tied to the timber harvest level in that benchmark. Since the resource production levels for resources other than timber is relatively constant between the benchmarks, their associated cost are also constant. The primary output, and hence cost, which varies between the benchmarks is timber.

TABLE 5-1

BENCHMARKS

Average Annual Outputs and Activities

(Decade 1 is the period 1990-1999)

ACTIVITY/RESOURCE	MLV	FLW	PNV	MKV	TBR	TBD	TBC	WLN	NON	FSH	WLD	RCR	CUR
	BENCHMARKS												
PNV (MM$)	1.90	3.00	2.88	2.88	2.42	2.77	2.54	2.44	2.88	2.88	2.40	2.58	2.70
TIMBER ALLOWABLE SALE QUANTITY (MMBF)													
Base Year	450	450	450	450	450	450	450	450	450	450	450	450	450
Decade 1	0	930	580	590	780	1.150	850	150	590	580	40	370	450
Decade 2	0	610	560	560	780	790	820	130	560	560	40	370	450
Decade 3	0	890	660	660	920	890	920	140	660	660	40	370	460
Decade 4	0	870	650	650	810	450	840	160	650	650	40	360	450
Decade 5	0	490	580	590	790	320	760	140	590	580	40	350	450
LONG TERM SUSTAINED YIELD													
(MMBF)	0	1,180	1.510	1.520	1.950	1.320	1.740	360	1,520	1,510	430	600	1,240
(MMCF)	0	280	340	340	410	300	370	70	340	340	110	140	250
REFORESTATION (Thousands of acres)													
Base Year	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0	17.0
Decade 1	0	35.2	22.2	22.5	28.1	42.7	31.3	5.8	24.0	22.1	1.4	13.7	23.3
Decade 2	0	23.3	19.7	19.8	27.3	31.3	29.7	4.5	19.8	19.6	1.3	12.1	16.2
Decade 3	0	35.1	26.2	26.1	35.3	34.8	34.7	5.0	26.2	26.2	1.4	12.8	17.5
Decade 4	0	36.0	25.5	25.6	31.6	19.4	35.4	6.2	25.5	25.5	1.3	12.7	25.4
Decade 5	0	25.4	24.7	24.7	33.1	15.7	37.5	5.5	24.6	24.7	1.3	13.0	42.4
RIPARIAN AREA HARVEST (MMBF/yr)													
Base Year	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Decade 1	0	0	0	0	53	4	42	0	0	0	0	5	5
Decade 2	0	0	0	0	53	4	42	0	0	0	0	5	5
Decade 3	0	0	0	0	53	4	42	0	0	0	0	5	5
Decade 4	0	0	0	0	53	4	42	0	0	0	0	5	5
Decade 5	0	0	0	0	53	4	42	0	0	0	0	5	5
ROAD CONSTRUCTION (Miles)													
Base Year	110	110	110	110	110	110	110	110	110	110	110	110	110
Decade 1	0	190	200	210	370	250	270	40	90	200	-	180	170
Decade 2	0	210	270	270	410	310	270	40	170	270	-	230	220
Decade 3	0	260	220	220	290	260	260	30	190	220	-	120	150
Decade 4	0	270	170	190	240	150	260	40	190	170	-	100	160
Decade 5	0	180	190	190	251	120	280	40	210	190	10	90	290

TABLE 5-1(cont)

BENCHMARKS

Average Annual Outputs and Activities

(Decade 1 is the period 1990-1999)

ACTIVITY/RESOURCE	MLV	FLW	PNV	MKV	TBR	TBD	TBC	WLN	NON	FSH	WLD	RCR	CUR
RECREATION AND TOURISM CAPACITY (MRVD)													
Base Year	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200
Decade 1	4,300	4,200	4,200	4,200	4,200	4,200	4,100	4,300	4,200	4,200	4,300	4,300	4,200
Decade 2	4,300	4,000	4,200	4,200	4,100	3,900	3,900	4,300	4,200	4,200	4,300	4,300	4,200
Decade 3	4,300	3,900	4,000	4,000	3,900	3,800	3,800	4,300	4,000	4,000	4,300	4,300	4,200
Decade 4	4,300	4,000	4,000	4,000	4,000	4,000	4,000	4,200	4,000	4,000	4,300	4,300	4,200
Decade 5	4,300	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,300	4,600	4,200
RECREATION AND TOURISM USE (MRVD)													
Base Year	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300	2,300
Decade 1	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800
Decade 2	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400	3,400
Decade 3	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800	3,800
Decade 4	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Decade 5	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200	4,200
BROWN BEAR (percent change in habitat capability)													
Base Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Decade 1	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Decade 2	0%	0%	0%	0%	0%	-1%	0%	0%	0%	0%	0%	0%	0%
Decade 3	0%	-2%	-2%	-2%	-2%	-3%	-2%	0%	-2%	-2%	0%	0%	0%
Decade 4	0%	-5%	-3%	-3%	-6%	-5%	-5%	0%	-3%	-3%	0%	-1%	-1%
Decade 5	0%	-9%	-4%	-4%	-10%	-7%	-10%	0%	-4%	-4%	0%	-1%	-2%
EAGLE (percent change in habitat capability)													
Base Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Decade 1	0%	-6%	-3%	-3%	-3%	-2%	-3%	-1%	-3%	-3%	0%	-2%	-1%
Decade 2	0%	-8%	-4%	-4%	-6%	-12%	-10%	-2%	-5%	-4%	-1%	-2%	-3%
Decade 3	0%	-20%	-9%	-9%	-21%	-26%	-21%	-3%	-9%	-9%	-1%	-4%	-7%
Decade 4	0%	-34%	-22%	-22%	-30%	-33%	-34%	-5%	-23%	-23%	-1%	-8%	-12%
Decade 5	0%	-44%	-32%	-32%	-41%	-40%	-41%	-7%	-32%	-32%	-1%	-10%	-23%

TABLE 5-1(cont)

BENCHMARKS

Average Annual Outputs and Activities

(Decade 1 is the period 1990-1999)

ACTIVITY/RESOURCE	MLV	FLW	PNV	MKV	TBR	TBD	TBC	WLN	NON	FSH	WLD	RCR	CUR
	BENCHMARKS												
DEER (percent change in habitat capability)													
Base Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Decade 1	0%	-9%	-6%	-6%	-7%	-9%	-7%	-2%	-6%	-6%	0%	-4%	-4%
Decade 2	0%	-14%	-10%	-10%	-12%	-17%	-14%	-3%	-10%	-10%	-1%	-6%	-8%
Decade 3	0%	-22%	-15%	-15%	-22%	-26%	-23%	-4%	-15%	-15%	-1%	-9%	-13%
Decade 4	0%	-31%	-23%	-23%	-29%	-31%	-31%	-6%	-23%	-23%	-2%	-13%	-17%
Decade 5	0%	-38%	-30%	-30%	-36%	-35%	-36%	-7%	-30%	-30%	-2%	-16%	-23%
BROWN CREEPER (percent change in habitat capability)													
Base Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Decade 1	0%	-4%	-18%	-18%	-15%	-21%	-22%	-5%	-18%	-18%	-2%	-13%	-11%
Decade 2	0%	-14%	-26%	-26%	-26%	-28%	-30%	-7%	-26%	-26%	-2%	-17%	-22%
Decade 3	0%	-21%	-32%	-32%	-37%	-40%	-40%	-11%	-32%	-32%	-2%	-27%	-28%
Decade 4	0%	-34%	-38%	-38%	-43%	-46%	-47%	-12%	-38%	-38%	-2%	-29%	-31%
Decade 5	0%	-43%	-47%	-47%	-52%	-50%	-51%	-14%	-47%	-47%	-2%	-30%	-39%
BLACK BEAR (percent change in habitat capability)													
Base Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Decade 1	0%	-1%	0%	0%	0%	-1%	-1%	0%	0%	0%	0%	0%	0%
Decade 2	0%	-6%	-4%	-4%	-5%	-6%	-5%	-1%	-4%	-4%	0%	-2%	-3%
Decade 3	0%	-10%	-6%	-6%	-9%	-12%	-10%	-2%	-7%	-6%	0%	-3%	-5%
Decade 4	0%	-16%	-11%	-11%	-15%	-18%	-16%	-2%	-11%	-11%	-1%	-5%	-7%
Decade 5	0%	-21%	-16%	-16%	-20%	-20%	-20%	-3%	-16%	-16%	-1%	-7%	-10%
PINE MARTIN (percent change in habitat capability)													
Base Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Decade 1	0%	-4%	-2%	-2%	-4%	-6%	-4%	-1%	-3%	-2%	0%	-2%	-2%
Decade 2	0%	-8%	-6%	-6%	-8%	-12%	-9%	-1%	-6%	-6%	0%	-4%	-5%
Decade 3	0%	-15%	-10%	-10%	-14%	-17%	-15%	-2%	-10%	-10%	-1%	-6%	-8%
Decade 4	0%	-21%	-15%	-15%	-20%	-21%	-21%	-3%	-15%	-15%	-1%	-8%	-12%
Decade 5	0%	-25%	-20%	-20%	-25%	-24%	-26%	-4%	-20%	-20%	-1%	-10%	-14%
RED BREASTED SAPSUCKER (percent change in habitat capability)													
Base Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Decade 1	0%	-6%	4%	4%	5%	-7%	-5%	1%	-4%	4%	0%	-2%	3
Decade 2	0%	-10%	-7%	-7%	-9%	-13%	-10%	-2%	-7%	-7%	0%	-4%	-5
Decade 3	0%	-16%	-11%	-11%	-16%	-19%	-16%	-2%	-12%	-11%	-1%	-6%	-8
Decade 4	0%	-22%	-16%	-16%	-21%	-22%	-23%	-4%	-16%	-16%	-1%	-8%	-11
Decade 5	0%	-27%	-20%	-20%	-27%	-25%	-30%	-4%	-20%	-20%	-1%	-10%	-15

TABLE 5-1(cont)

BENCHMARKS

Average Annual Outputs and Activities

(Decade 1 is the period 1990-1999)

ACTIVITY/RESOURCE	MLV	FLW	PNV	MKV	TBR	TBD	TBC	WLN	NON	FSH	WLD	RCR	CUR
HAIRY WOODPECKER (percent change in habitat capability)													
Base Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Decade 1	0%	-11%	-8%	-8%	-8%	-13%	-10%	-2%	-8%	-8%	-1%	-5%	-5%
Decade 2	0%	-18%	-13%	-13%	-16%	-22%	-18%	-3%	-14%	-13%	-1%	-9%	-11%
Decade 3	0%	-28%	-20%	-20%	-26%	-31%	-28%	-5%	-20%	-20%	-1%	-14%	-16%
Decade 4	0%	-36%	-28%	-28%	-34%	-36%	-36%	-7%	-28%	-28%	-1%	-18%	-21%
Decade 5	0%	-41%	-34%	-34%	-41%	-39%	-43%	-9%	-34%	-34%	-1%	-21%	-26%
RIVER OTTER (percent change in habitat capability)													
Base Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Decade 1	0%	-6%	-4%	-4%	-4%	-4%	-5%	-1%	-4%	-4%	0%	-1%	-3%
Decade 2	0%	-9%	-5%	-5%	-8%	-12%	-10%	-1%	-5%	-5%	0%	-2%	-4%
Decade 3	0%	-20%	-13%	-13%	-20%	-24%	-21%	-2%	-13%	-13%	-1%	-4%	-7%
Decade 4	0%	-31%	-22%	-22%	-28%	-29%	-30%	-4%	-22%	-22%	-1%	-6%	-11%
Decade 5	0%	-39%	-29%	-29%	-37%	-35%	-36%	-5%	-29%	-29%	-1%	-8%	-18%
RED SQUIRREL (percent change in habitat capability)													
Base Year	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Decade 1	0%	-4%	-2%	-2%	-3%	-4%	-3%	-1%	-2%	-6%	0%	-1%	-3%
Decade 2	0%	-6%	-3%	-3%	-6%	-7%	-5%	-1%	-3%	-6%	0%	-3%	-4%
Decade 3	0%	-9%	-7%	-7%	-10%	-11%	-10%	-1%	-7%	-7%	0%	-3%	-7%
Decade 4	0%	-13%	-9%	-9%	-13%	-12%	-14%	-2%	-9%	-9%	0%	-5%	-11%
Decade 5	0%	-17%	-11%	-11%	-17%	-15%	-20%	-2%	-11%	-11%	0%	-7%	-18%
COMMERCIAL SALMON (Millions of pounds)													
Base Year	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0	118.0
Decade 1	118.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Decade 2	118.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Decade 3	118.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Decade 4	118.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Decade 5	118.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0	130.0
KING SALMON (Millions of pounds)													
Base Year	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3	7.3
Decade 1	7.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Decade 2	7.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Decade 3	7.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Decade 4	7.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Decade 5	7.3	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0

TABLE 5-1(cont)

BENCHMARKS

Average Annual Outputs and Activities

(Decade 1 is the period 1990-1999)

	BENCHMARKS												
ACTIVITY/RESOURCE	MLV	FLW	PNV	MKV	TBR	TBD	TBC	WLN	NON	FSH	WLD	RCR	CUR
COHO SALMON (Millions of pounds)													
Base Year	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5	10.5
Decade 1	10.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Decade 2	10.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Decade 3	10.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Decade 4	10.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
Decade 5	10.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5	17.5
CHUM SALMON (Millions of pounds)													
Base Year	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0	27.0
Decade 1	27.0	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
Decade 2	27.0	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
Decade 3	27.0	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
Decade 4	27.0	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
Decade 5	27.0	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5	29.5
PINK SALMON (Millions of pounds)													
Base Year	57.6	57.6	57.6	57.6	57.6	57.6	57.6	57.6	57.6	57.6	57.6	57.6	57.6
Decade 1	57.6	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0
Decade 2	57.6	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0
Decade 3	57.6	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0
Decade 4	57.6	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0
Decade 5	57.6	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0	63.0
SOCKEYE SALMON (Millions of pounds)													
Base Year	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6	7.6
Decade 1	7.6	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Decade 2	7.6	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Decade 3	7.6	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Decade 4	7.6	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Decade 5	7.6	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
SPORT FISHING (Thousands of user days)													
Base Year	160	160	160	160	160	160	160	160	160	160	160	160	160
Decade 1	220	220	220	220	220	220	220	220	220	220	220	220	220
Decade 2	250	250	250	250	250	250	250	250	250	250	250	250	250
Decade 3	275	275	275	275	275	275	275	275	275	275	275	275	275
Decade 4	280	280	280	280	280	280	280	280	280	280	280	280	280
Decade 5	290	290	290	290	290	290	290	290	290	290	290	290	290

TABLE 5-1(cont)

BENCHMARKS

Average Annual Outputs and Activities

(Decade 1 is the period 1990-1999)

ACTIVITY/RESOURCE	MLV	FLW	PNV	MKV	TBR	TBD	TBC	WLN	NON	FSH	WLD	RCR	CUR
	BENCHMARKS												
HUNTING (Thousands of user days)													
Base Year	40	40	40	40	40	40	40	40	40	40	40	40	40
Decade 1	50	50	50	50	50	50	50	50	50	50	50	50	50
Decade 2	60	60	60	60	60	60	60	60	60	60	60	60	60
Decade 3	70	70	70	70	70	70	70	70	70	70	70	70	70
Decade 4	75	75	75	75	75	75	75	75	75	75	75	75	75
Decade 5	80	80	80	80	80	80	80	80	80	80	80	80	80
AREA MAINTAINED (Millions of Acres) IN A NATURAL CONDITION	15.8	7.4	6.3	5.8	5.4	8.0	5.4	15.8	5.4	6.3	10.1	6.5	5.4
TOTAL FOREST SERVICE COST (Millions of dollars)													
Base Year	55	55	55	55	55	55	55	55	55	55	55	55	55
Decade 1	15	122	89	91	139	154	139	33	72	89	20	75	76

CHAPTER 6
POTENTIAL TO RESOLVE ISSUES

CHAPTER 6 - POTENTIAL TO RESOLVE ISSUES AND CONCERNS

PURPOSE OF THIS CHAPTER

This chapter explores the potential to resolve the public issues and concerns identified in Chapter 2 of this document. As detailed in Deputy Chief Overbay's letter of 8/1/89, the potential to resolve issues is one of the components of the determination of the need to change management direction. The findings of this chapter, along with other information presented on benchmarks, current situation, supply/demand, etc., provide a foundation for the determination of the need to change management direction (Chapter 7).

DEFINING "POTENTIAL TO RESOLVE ISSUES"

Issues play a central role in the Forest Service planning process. They reflect the concerns of the public and serve to focus the decisions to be made in Forest Plans. Before attempting to determine the potential to resolve the identified issues, some clarifications are warranted on what this phrase means.

"Potential" will be interpreted to mean the ability or capacity of the Forest Service to resolve the issues. There are varying definitions and uses of the word "resolve". Some of these include:

> "1. To make a firm decision about... 3. To decide or express by formal vote... 6. To reach a solution to... 8. To bring to a usually successful conclusion" (Webster's II New Riverside University Dictionary, 1984).

Issue resolution in the Forest Service planning process is focused primarily on attempting to reach a solution to an issue or trying to reach a conclusion on what land allocations and management practices should occur on a National Forest for the next 10 to 15 years. Although some members of the public think of providing comments on Forest planning issues as "casting their vote", these issues are not resolved by voting. Rather, the concerns and opinions of the public are meshed with the experience and knowledge of resource management professionals to arrive at solutions to issues.

INTERRELATIONSHIPS BETWEEN ISSUES

The issues are interrelated, as was discussed in the "Interrelationships with Other Major Issues" section of Chapter 2. As one issue is resolved by a particular mix of land allocations and management practices, people that hold opinions about other issues may think that their concerns are not adequately addressed. The degree to which issues can be resolved is limited by the fact that managing for some resource uses does not always complement other uses. However, in this chapter, the potential to resolve any one issue by some type of management action is the focus. Tradeoff relationships that may result from different management responses to the issues are discussed in Chapter 5, "Benchmark Results."

ISSUES AND THE POTENTIAL TO RESOLVE THEM

Public opinion is an important ingredient in resolving issues. In managing the resources of the Tongass National Forest, it is imperative that the Forest Service be responsive to public concerns and issues. In defining the potential to resolve the identified public issues, three steps are taken: 1) a brief summary of public opinion on the issue sets the framework; 2) options to resolve the issue are listed; and 3) the options are analyzed to determine how well they may contribute to issue resolution.

Scenic Quality

What areas on the Tongass National Forest should be managed to emphasize natural scenic quality?

Public Opinion

Public opinion is generally in favor of continuing to provide high quality natural scenery from the Tongass National Forest. Tourism in Southeast Alaska is primarily a wildland-based industry: in opinion surveys, scenic quality is the most-cited purpose for visiting Alaska. The Tongass provides 90 percent of the wildland setting in Southeast Alaska. However, there is no consensus on where or how to provide high quality scenery on the Forest.

Another segment of the public, however, feels that the Southeast's overall economy, including the timber industry, is more important than visual quality.

Options to Resolve

Some options to resolve the scenic quality issue have been developed considering public opinion and the results of TLMP implementation and monitoring. These options are not mutually exclusive, meaning a combination of options could be used to resolve the issue. The options are as follows:

1. Continue to manage for scenic quality using the retention factors method detailed in TLMP.

2. Provide specific locations (mapped) which will be managed for scenic quality. These may include proposed scenic byways, ferry routes, major air carrier flight routes, etc. Assign specific visual quality objectives to areas of the forest.

3. Generate standards and guidelines which provide programmatic management direction for emphasizing or maintaining natural scenic quality.

4. Mesh the provision of scenic quality with a compatible land allocation (e.g., wildlife habitat, roadless area management, etc.).

5. Emphasize scenic quality on areas of the Forest which were identified by the public as important for scenic quality. Provide this emphasis through land allocations and making other resource uses subordinate to the maintenance of existing scenic quality.

6. Explicitly identify where scenic quality may be reduced by management activities, and detail what types of reductions in visual quality are permissible.

Analysis of the Options

There are two facets to the resolution of this issue. One interpretation of the issue would suggest that there is a simple allocation choice to be made for the Tongass; that choice is "What areas?" The other facet of the issue, not as apparent, is "How to do it?", or "What kind of programmatic direction should be provided for scenic quality?"

<u>Option 1</u> - Option 1 would result in a continuation of the management practices of the Tongass Land Management Plan. Other options which are available and compatible with Option 1 (e.g., Option 2 which proposed mapping of specific locations) could provide additional direction, enhancing the probability of reaching an acceptable solution to the issue.

During implementation of the Tongass Land Management Plan, managing for scenic quality has been a continuing issue, both internally and externally. Since there are no specific targets for visual quality, there have been debates which addressed whether project activities have complied with the direction of TLMP. There have been substantial and on-going disagreements between resource specialists over how to meet retention factors for scenic quality.

Many people have expressed concerns about reductions in scenic quality on some areas of the Tongass during the implementation of TLMP. These people think that more consideration should be given to the maintenance of visual quality. The disagreements between agency resource specialists have influenced the dissatisfaction that members of the public have experienced with changes in scenic quality. It has not been explicit where scenic quality in LUD's 3 and 4 would be maintained, and what measures (i.e., standards and guidelines) would be adhered to.

There have been some difficulties in retaining the desired visual quality of certain areas while completing scheduled timber harvests. Option 1 may perpetuate this situation, and consequently, probably not resolve the identified issue and the accompanying management concerns (i.e., the "How to" facet of the issue).

<u>Option 2</u> - This option could clarify where scenic quality would be maintained. Although it is very unlikely that any one management strategy for scenic areas would satisfy all interested individuals, this option would provide delineated visual quality objectives.

This option could be expanded to include mapped proposals for emphasizing scenic quality such as in scenic byways proposals or other specifically identified areas of concern to users. Visual quality objectives which would be binding on certain project activities could also be established.

<u>Option 3</u> - Standards and guidelines were not developed when the Tongass Land Management Plan was completed in 1979. This option would provide programmatic direction for the provision of scenic quality Forest-wide.

This option could facilitate issue resolution significantly. The provision of scenic quality has been an issue within the Forest Service because resource specialists have different interpretations of how to implement existing direction. By providing explicit programmatic direction for scenic quality, some of the disagreements which have occurred internally should be eliminated.

Explicit direction could provide the foundation for more consistent management of scenic quality on the Tongass. Standards and guidelines, if coupled with mapped management areas (Option 2), would provide the public with a more complete picture on how the Tongass would be managed in future years.

<u>Option 4</u> - Management activities have different effects on scenic quality. For example, emphasizing wildlife or fish habitat management or wilderness results in little or no impacts on scenic quality. Other management activities are less compatible with maintaining the existing visual quality; activities which have the most adverse effects include clearcut timber harvest and mining-related surface disturbance.

The potential to find an acceptable solution to the scenic quality issue is linked to how other issues are resolved. Preserving natural scenery in important viewing areas could occur as a result of management allocations for other resource uses compatible with the maintenance of scenic quality. The maintenance of natural scenery is compatible with many other resource objectives, such as preservation of old growth for wildlife habitat.

Option 5 - Under this option, areas of the Tongass would be specifically managed to maintain or emphasize natural scenic quality. Areas which were identified by the public as important for scenic quality could be managed to provide visual quality first, and other uses as compatible. Other-than-traditional timber harvest methods could be used.

This option would provide a baseline for those people who are concerned primarily with scenic quality, but do not have specific preferences for wilderness or other uses of the Forest that result in maintenance of the existing visual condition.

Option 6 - Areas where scenic quality could be reduced by management activities would be identified under this option. Also, the effects on scenic quality that would be permissible would be detailed.

This option would focus on the reductions in scenic quality that might be permissible on the Forest. Rather than treating reduction of visual quality as a by-product of some management activity, this option would identify where scenic quality was less important on the Forest and where changes in visual quality would be acceptable. Scheduled management activities would not be subordinate to the objectives for scenic quality.

Recreation Opportunities

What areas should be managed to emphasize recreation opportunities?

Public Opinion

Many residents of Southeast Alaska have favorite locations where they regularly go for recreational activities (e.g., hunting, camping, fishing, etc.). Characteristically, these recreation experiences have a high degree of solitude, and most recreationists are very sensitive to changes in the type of recreation experience that they have had in the past and expect to have in the future. Often, any change in a particular area which has been a favorite recreation spot will be viewed as negative by some people if that change will result in a different type of recreational experience.

Because use is widely dispersed over the Forest, most people have come to expect a high degree of solitude in their recreation experiences in Southeast Alaska. Recreationists tend to avoid other forest users, by moving to alternate locations when their primary destination is occupied.

Many people want their favorite recreation places to be managed to maintain existing recreation opportunities. Most people want additional areas to be managed for recreation opportunities so that there will be an adequate future supply of alternate locations. People have different tolerance levels, however, on what changes may occur in recreation areas without significantly altering their recreation experience. Recreation places near communities also often contribute to attracting tourists, and play an important role in local and forestwide tourist industries.

Options to Resolve

Some options to resolve the recreation issue have been developed, considering public opinion and the results of TLMP implementation and monitoring. These options are not mutually exclusive, meaning a combination of options could be used to resolve the issue. The options are as follows:

1. Continue to manage for recreation using the direction of TLMP, but be more aggresive in scheduling and budgeting proposed projects.

2. Provide specific locations (mapped) which will be managed for specific recreation opportunities. These may include areas which will be managed for dispersed or developed recreation.

3. Generate standards and guidelines which provide programmatic management direction for emphasizing or maintaining recreation opportunities.

4. Mesh the provision of recreation with some other compatible land allocation (e.g., wildlife habitat, roadless area management, etc.).

5. Emphasize recreation opportunities on areas of the Forest which were identified by the public as important. Provide this emphasis through land allocations and making other resource uses subordinate to the provision of recreation opportunities.

6. Explicitly identify where recreation opportunities may be reduced or changed by management activities, and detail what types of reductions or changes are permissible.

7. Provide recreation opportunities that meet short-range and long-range demand projections.

Analysis of the Options

There are two facets to the resolution of this issue. One interpretation of the issue would suggest that there is a simple allocation choice to be made for the Tongass; that choice is "What areas?" The other facet of the issue, not as apparent, is "How to do it?", or "What kind of programmatic direction should be provided for recreation"?

Option 1 - Option 1 would result in a continuation of the management practices of the Tongass Land Management Plan. Other options which are available and compatible with Option 1 (e.g., Option 2 which proposed mapping of specific locations) could provide additional direction, enhancing the probability of reaching an acceptable solution to the issue.

Some people have expressed concerns about reductions in some types of recreation opportunities on the Tongass during the implementation of TLMP. Timber harvest has changed some areas of the Forest which were previously used for primitive or semi-primitive dispersed recreation. Road construction and timber harvest change the type of recreation experience available within an area of the Forest; generally, development activities result in less primitive or semi-primitive recreation and more roaded, modified types of recreation.

Under the current Tongass Plan, programmatic direction for recreation is very limited. Certain Land Use Designations (LUD 1 and LUD 2) are compatible with the maintenance of existing recreation opportunities. Lands allocated to LUD 3 or LUD 4 are available for development activities, but there is broad latitude to manage for recreation within these areas. This latitude has resulted in some

differences in implementation of the Tongass Plan among Administrative Areas and Ranger Districts.

Generally, there is a desire among agency personnel and the interested public for more explicit programmatic direction for recreation. Option 1 does not satisfy this desire, and consequently, would not adequately resolve the issue if no other modifications to TLMP were made.

Option 2 - This option could clarify where recreation opportunities would be provided. Although it is very unlikely that any one management strategy for recreation would satisfy all interested individuals, this option would provide delineated, identifiable areas where recreation opportunities would be maintained. The degree of usefulness to issue resolution is dependent upon map scale, and accuracy of descriptions.

Option 3 - Standards and guidelines were not developed when the Tongass Land Management Plan was completed in 1979. This option would provide programmatic direction for the provision of recreation Forest-wide and by management area.

This option could facilitate issue resolution significantly. During plan implementation, there have been some internal disagreements within the agency because of varying opinions about what management actions were appropriate for recreation management. Similarly, the interested public have not been sure what management practices will occur on the Forest for recreation.

Explicit direction could provide the foundation for more consistent management of recreation on the Tongass. Standards and guidelines, if coupled with mapped management areas (Option 2), would provide the public with a more complete picture on how the Tongass would be managed in future years.

Option 4 - Management activities have different effects on recreation. For example, emphasizing wildlife or fish habitat management or wilderness generally does not change or degrade current recreation opportunities. Other management activities are less compatible with maintaining existing dispersed recreation opportunities; activities which cause the most dramatic changes in recreation settings include clearcut timber harvest, road construction, and mining-related surface disturbance.

The potential to find an acceptable solution to the recreation issue is linked to how other issues are resolved. Existing recreation opportunities could be maintained as a result of management allocations for other resource uses which are compatible with the recreation settings.

Option 5 - Under this option, areas of the Tongass would be specifically managed to maintain or emphasize recreation opportunities. Areas which were identified by the public as important for recreation could be managed to provide these opportunities first, and other uses as compatible.

This option would provide a baseline for those people who are concerned primarily with recreation, but do not have specific preferences for wilderness or other uses of the Forest that result in maintenance of existing recreation opportunities.

Option 6 - Areas where recreation opportunities could be reduced or changed by management activities would be identified under this option. Also, the effects on recreation settings that would be permissible would be detailed.

This option would focus on the changes in recreation settings and opportunities that might be permissible on the Forest. Rather than treating these changes as a by-product of some management activity, this option would identify where existing recreation settings are less important on the Forest and where changes in settings and opportunities would be acceptable. Objectives for recreation would be subordinate to scheduled management activities.

Option 7 - To resolve this issue, it is essential that a broad enough range of recreation opportunities and capacities be available to meet or exceed existing and future recreation demand. An excess of recreation opportunities may need to be maintained in the short-term to meet projections for future demand.

The relationships among the benchmarks indicate that future recreation demand can be met if timber harvests are at or below a level of 360 MMBF annually.

Fish Habitat

What methods should be used to protect resident and anadromous fish habitat?

Public Opinion

Public opinion is strongly in favor of producing resident and anadromous fish from the Tongass. There is little question or debate about the Forest's importance for fish production. Similarly, the importance of fish production in the economy of Southeast Alaska is widely recognized.

However, there is no consensus on the methods that should be used to manage fish habitat on the Forest. Currently, relevant scientific research is extremely limited, and opinions vary about the effects of timber harvest and road construction on fish production and habitat.

Options to Resolve

Some options to resolve the fish habitat issue have been developed, considering public opinion and the results of TLMP implementation and monitoring. These options are not mutually exclusive, and are as follows:

1. Continue to manage for fish habitat using the direction of TLMP.

2. Map or explicitly describe where fish habitat management is to be emphasized.

3. Generate standards and guidelines which provide programmatic management direction for maintaining or emphasizing fish habitat.

4. Mesh the provision of fish habitat with compatible land allocations.

5. Emphasize fish habitat management on areas of the Forest which were identified by the public as important. Provide this emphasis through land allocations and making other resource uses subordinate to fish habitat management.

6. Explicitly identify where and how fish habitat may be affected by management activities.

Analysis of the Options

The issue question implies that the only facet of the issue is the identification of methods to use for fish habitat management. Also needed for issue resolution is a clear understanding of where fish habitat management will be emphasized for fish habitat protection.

Option 1 - The Tongass Land Management Plan established a goal for maintaining the biological productivity of every fish stream on the Forest. Although the Plan stated a goal for fish habitat productivity, specific direction which detailed how this goal would be attained was not established. Consequently, as more information on the habitat requirements for fish became available, it was evident that some timber management activities may have resulted in detrimental effects on habitat capability for fish.

During the life of the Tongass Plan, some changes in fish habitat management have occurred. These changes include the provision of buffer strips which provide a perpetual source of woody debris. Current measures used to protect resident and anadromous fish habitat include buffer strips, as recently displayed in the KPC 89-94 Operating Period EIS.

During Plan implementation, there have been disagreements between Forest Service resource specialists about the methods that should be used to meet the management goal of TLMP for fish habitat. Although there was broad agreement on the management goal, the general understanding of how to accomplish the goal was lacking. Generally, continuing to manage the Tongass as directed by TLMP will perpetuate this situation.

Option 2 - This option could clarify where fish habitat management would be provided. However, this option's effectiveness in issue resolution is very dependent upon map scale.

Option 3 - Standards and guidelines were not developed when the Tongass Land Management Plan was completed in 1979. However, some direction for fish habitat management is contained in other documents (e.g., Aquatic Habitat Management Handbook, etc.). This option would consolidate programmatic direction for fish habitat management in the Forest Plan, rather than in several documents.

This option could facilitate issue resolution significantly. During plan implementation, there have been some internal disagreements within the agency because of varying opinions about what management actions were appropriate for fish habitat management. Similarly, the interested public has not been sure what management practices would occur on the Forest for fish habitat.

Explicit direction could provide the foundation for more consistent management of fish habitat on the Tongass. Standards and guidelines, if coupled with mapped management areas (Option 2), would provide the public with a more complete picture on how the Tongass would be managed in future years.

Option 4 - Management activities can have different effects on fish habitat. For example, emphasizing wilderness, recreation or wildlife habitat management generally maintains existing fish habitat. Other management activities are less compatible with maintaining existing fish habitat; activities which could affect fish habitat include clearcut timber harvest, road construction, and mining-related surface disturbance.

The potential to find an acceptable solution to the fish habitat issue is linked to how other issues are resolved. Existing fish habitat could be maintained as a result of management allocations for other resource uses which are compatible with the habitat requirements of fish.

Option 5 - Under this option, areas of the Tongass would be specifically managed to maintain or emphasize fish habitat. Areas which were identified by the public as important for fish could be managed to provide these opportunities first, and other uses as compatible.

This option would provide a baseline for those people who are concerned primarily with fish habitat, but do not have specific preferences for wilderness or other uses of the Forest that result in maintenance of existing fish habitat.

Option 6 - This option would focus on the reductions in fish habitat that might be permissible on the Forest. Rather than treating the reduction of fish habitat as a by-product of some management activity, this option would identify where fish habitat was less important on the Forest and where changes in habitat would be acceptable. Objectives for fish habitat would be subordinate to scheduled management activities.

Old-growth and Wildlife Habitat

What amount of old-growth and undeveloped habitat should be managed for the protection of wildlife?

Public Opinion

Generally, public opinion is strongly in favor of protecting and maintaining wildlife populations. Residents of Southeast Alaska want to view or hunt some wildlife species, and abundant wildlife populations are an important factor in the attraction of tourists to the region.

Although there is broad agreement on the desirability of wildlife, public opinion is divided on how to manage wildlife habitat. Some people think that timber harvests reduce wildlife habitat, and consequently, will result in population declines for some species of wildlife. Others think that timber harvests can improve wildlife habitat, and no reductions in wildlife populations will occur as a result of timber management activities. Some people are concerned primarily with the maintenance of old-growth forest for human needs; although old-growth dependent wildlife species are valued by these people, maintaining the existing condition of the Forest is extremely important from an intrinsic standpoint.

Options to Resolve

The potential to resolve this issue, as currently defined, is low because substantially different opinions can easily be drawn from the available research and data. Currently, the issue question centers on how much old-growth and undeveloped habitat should be maintained for wildlife purposes; in reality, this issue is much larger. There are many people that are concerned about the retention of old-growth for other reasons, e.g., aesthetic, recreational, spiritual, etc. By defining the issue too narrowly and focusing on the biological needs of wildlife, some other reasons for maintaining old-growth may be discounted or missed.

Some options to consider which may assist in resolution of this issue include the following:

1. Continue to manage for wildlife habitat using the direction of TLMP. The retention factors method would continue to be used.

2. Provide specific locations (mapped) which will be managed for wildlife habitat. These locations would include old-growth stands which would be managed to maintain existing forest conditions.

3. Generate standards and guidelines which provide programmatic management direction for emphasizing or maintaining old-growth forest and wildlife habitat.

4. Mesh the provision of wildlife habitat with a compatible land allocation (e.g., scenic quality, roadless area management, etc.).

5. Emphasize wildlife habitat on areas of the Forest which were identified by the public as important. Provide this emphasis through land allocations and making other resource uses subordinate to the maintenance of existing widlife habitat.

6. Explicitly identify where wildlife habitat may be reduced by management activities, and detail what kinds of reductions in wildlife habitat are permissible.

7. Search for ways to reduce the polarization and conflict over this issue. Involve those people who are most concerned about this issue and the timber harvest issue in a group activity that seeks some solutions to the land allocation challenge at hand.

8. Provide viable population levels of wildlife, and a buffer of some additional percent of the viable population level for all Management Indicator Species, through land allocations which maintain old-growth stands.

Analysis of the Options

This issue will be very challenging to resolve because the tradeoffs between competing interests are quite apparent and very significant. As displayed in the Benchmark Analysis of Chapter 5, the benchmark which maximizes old-growth associated habitat for wildlife has the lowest programmed timber sale level of all benchmarks. Conversely, the benchmark which maximizes timber production has the lowest wildlife habitat capability among all the benchmarks.

Option 1 - Option 1 would result in a continuation of the management practices of the Tongass Land Management Plan. Other options which are available and compatible with Option 1 (e.g., Option 2 which proposed mapping of specific locations) could provide additional direction, enhancing the probability of reaching an acceptable solution to the issue.

Some people have expressed concerns about reductions in old-growth wildlife habitat during the implementation of TLMP. Timber harvests have occurred in ___ acres of old-growth during the past decade.

Under the Tongass Plan, programmatic direction for wildlife was limited. Certain Land Use Designations (LUD 1 and LUD 2) were compatible with the maintenance of all existing old-growth forest. Lands allocated to LUD 3 or LUD 4 were available for development activities; however, there was some provision for management of wildlife habitat within these areas. Retention factors were developed which were intended to provide protection for wildlife, fish and visual resources when timber sales were prepared.

Generally, there is a desire among agency personnel and interested publics for more explicit programmatic direction for wildlife habitat management, specifically old-growth habitat. Some people want a specific land allocation for old growth which would ensure that certain amounts of old growth would be distributed throughout the Forest. Option 1 does not satisfy this desires, and consequently, would not adequately resolve the issue if no other modifications to TLMP were made.

Option 2 - This option could clarify where old-growth wildlife habitat would be provided. Although it is very unlikely that any one management strategy for wildlife habitat would satisfy all interested individuals, this option would provide delineated, identifiable areas where old-growth habitat would be maintained. The degree of usefulness to issue resolution is dependent upon map scale and accuracy of descriptions.

Option 3 - Standards and guidelines were not developed when the Tongass Land Management Plan was completed in 1979. This option would provide programmatic direction for the provision of wildlife habitat Forest-wide and by management area.

This option could facilitate issue resolution significantly. During plan implementation, there have been some disagreements between resource specialists because of varying opinions about what management actions were appropriate to comply with the retention factors of TLMP. Similarly, interested publics have not been sure what management practices will occur on the Forest in important old-growth wildlife habitat.

Explicit direction could provide the foundation for more consistent management of wildlife habitat on the Tongass. Standards and guidelines, if coupled with mapped management areas (Option 2), would provide the public with a more complete picture on how the Tongass would be managed in future years.

Option 4 - Management activities have different effects on wildlife habitat. For example, emphasizing scenic quality or recreation opportunities generally results in maintained wildlife habitat. Other management activities are less compatible with maintaining existing old-growth wildlife habitat; activities which have the most adverse effects include clearcut timber harvest, road construction, and mining-related surface disturbance.

The potential to find an acceptable solution to the wildlife habitat issue is linked to how other issues are resolved. Existing old-growth wildlife habitat could be maintained as a result of management allocations for other resource uses which are compatible with wildlife habitat requirements.

Option 5 - Under this option, areas of the Tongass would be specifically managed to maintain or emphasize old-growth wildlife habitat. Areas which were identified by the public as important for wildlife habitat could be managed to provide these opportunities first, and other uses as compatible.

This option would provide a baseline for those people who are concerned primarily with wildlife habitat, but do not have specific preferences for wilderness or other uses of the Forest that result in maintenance of existing habitat conditions.

Option 6 - Areas where old-growth habitat could be reduced by management activities would be identified under this option. Also, the effects on wildlife habitat that would be permissible would be detailed.

This option would focus on the reductions in old-growth habitat that might be permissible on the Forest. Rather than treating the reduction of habitat as a by-product of some management activity, this option would identify where old-growth wildlife habitat was less important on the Forest and where changes in habitat would be acceptable. Objectives for habitat management would be subordinate to scheduled management activities.

Option 7 - This option would explore ways to reduce the polarization and conflict that presently surrounds the old growth habitat and timber harvest issues. Some possible ways could include public workshops which focus on joint problem solving or facilitated meetings which deal with conflicts between competing interests. This approach has been used with varying success in other Forest planning efforts, generally after a Draft Plan and EIS have been released.

As displayed in the benchmark results, the wildlife and timber issues appear to be the most competitive of all the issues under consideration. Maximizing either of these resource uses results in greater effects upon the other resource output level than under any other modeling scenario. However, other resource relationships are competitive also (e.g., wilderness and timber production, recreation/scenic quality and timber production), and any work group dealing with conflicting issues may want to consider a "holistic" solution to Tongass management rather than strictly focusing on the relationship between two issues.

Option 8 - As displayed in the benchmark results, about 24 percent of the viable suitable acres of old-growth habitat is required to maintain viable population levels of the management indicator species. All Benchmarks show that viable population levels can be maintained.

The key question in resolving this issue is determining how much old-growth habitat should be provided above the amount which is needed to maintain viable populations of old-growth-associated species wildlife. Considering the lack of data and study on some old-growth-associated species (e.g., brown creepers) in Southeast Alaska, the potential for substantial disagreements over how much habitat is needed to provide viable population levels is great. Part of the disagreement may also center around where the habitat is provided (i.e., should a minimum viable population be ensured Forest-wide, by geozone, etc.). Another aspect of the problem is the difficulty that we currently have in identifying old-growth stands, and which old-growth stands will be maintained.

Subsistence Opportunities

What should the Forest Service do to continue providing subsistence opportunities?

Public Opinion

Within Southeast Alaska, public opinion is strongly in favor of continuing to provide subsistence opportunities on the Forest. Many people in Southeast Alaska view subsistence opportunities as an integral part of their lifestyle: these people are very concerned about any management activities that may affect subsistence opportunities.

Opinions about subsistence are strongly held, and any Forest Service activities which change the condition of the Forest are viewed by some people as affecting

their subsistence opportunities. Logging and road construction are some activities which are often viewed as detrimental to the maintenance of subsistence opportunities.

Options to Resolve

This issue is complex and will be difficult to resolve. Some of the complexities are rooted in the historical chain of events which led to the subsistence provisions (Title VIII) in the Alaska National Interest Lands Conservation Act of 1980, and the difficulties that people have in arriving at a common understanding of what subsistence means. Some options to consider for resolution of this issue include the following:

1. Continue to manage for subsistence opportunities using the direction of TLMP.

2. Identify locations where subsistence opportunities will be maintained through the direction and allocations of the Revised Forest Plan.

3. Generate standards and guidelines which provide programmatic management direction for providing subsistence opportunities.

4. Mesh the provision of subsistence opportunities with a compatible land allocation (e.g., scenic quality, roadless area management, etc.).

5. Emphasize subsistence opportunities on areas of the Forest which were identified by the public as important. Provide this emphasis through land allocations and making other resource uses subordinate to the provision of subsistence opportunities.

6. Explicitly identify where management activities may result in some changes in subsistence opportunities. Prior to any project implementation, an analysis of effects would occur as specified by Title VIII of ANILCA.

Analysis of the Options

Because subsistence means different things to different people, resolution of this issue may be very challenging. A clear definition of what subsistence is will be a key part of the resolution of this issue.

Option 1 - TLMP provided very little direction for subsistence management. However, as discussed in Chapter 3, there is no evidence of any reductions in subsistence harvests or opportunities occurring as a result of recent Forest Service management activities.

Increasingly, the agency has been pressured by interested groups to clearly state policies and practices that will be followed to protect subsistence opportunities in the Revised Forest Plan. Continuing to manage for subsistence using the direction of TLMP would probably not meet the expectations of certain interest groups.

Option 2 - This option could clarify where subsistence opportunities would be provided on the Tongass. However, this option's effectiveness would be dependent upon the map scale and the accuracy of the descriptions of areas where subsistence would be emphasized or maintained.

Option 3 - Standards and guidelines were not developed when the Tongass Land Management Plan was completed in 1979. This option would provide programmatic direction for the provision of subsistence opportunities Forest-wide and by management area.

Explicit direction could provide the foundation for more consistent consideration and management of subsistence opportunities on the Tongass National Forest. This direction could also assist in bringing more consistency to the definition of what subsistence opportunities were on the Tongass. Standards and guidelines, if coupled with mapped areas that would be managed to maintain subsistence opportunities (Option 2), would provide the public with a more complete picture of how the Tongass would be managed in future years.

Option 4 - Although there is no evidence of reductions in subsistence harvests or opportunities, management activities may result in changes to areas where subsistence activities normally occur. Some subsistence users may view management activities such as timber harvest or road construction as negative, while other management activities (fish enhancement projects, recreation cabins) are perceived as favorable for subsistence opportunities.

The potential to find an acceptable solution to the subsistence issue is linked to how other issues are resolved. Subsistence opportunities could be provided as a result of management allocations for other resource uses which are viewed by subsistence users and groups as compatible with their needs.

Option 5 - This option would specifically maintain or emphasize subsistence opportunities on areas of the Tongass which were identified by the public as important for subsistence. Subsistence opportunities would be provided first, and then other resource uses would be provided if they were compatible with subsistence.

This option would provide a baseline for those people who are concerned primarily with subsistence opportunities, but do not have specific preferences for other resource uses (e.g., wilderness, recreation, scenic quality, etc.).

Option 6 - This option would focus on areas of the Forest where subsistence opportunities may be less important. Rather than treating possible effects on subsistence opportunities as a by-product of some management activity, this option would identify where subsistence opportunities do not occur or are less important to users.

Timber Harvest

What areas of the Tongass should be managed to emphasize timber harvesting?

Public Opinion

As detailed in Chapter 2, public opinion is sharply divided on how the Tongass timber program should be managed. Specific points of contention include the continuation of the long-term sale contracts, the current timber sale program level of 4.5 billion board feet per decade, and the Tongass Timber Supply Fund provision.

Options to Resolve

This issue is tied directly to the resolution of other resource allocation issues (e.g., wildlife habitat, scenic quality, recreation opportunities, roadless areas, etc.). Because public opinion is so divided on this issue, resolution may be difficult. However, some options which may contribute to issue resolution include the following:

1. Continue to manage using the direction of TLMP.

2. Map or explicitly describe where timber management activities are to occur during the Revised Forest Plan.

3. Generate standards and guidelines which provide programmatic management direction for timber management activities.

4. Emphasize timber production on areas of the Forest which were identified by the public as important. Provide this emphasis through land allocations and making other resource uses subordinate to timber management activities.

5. Explicitly identify where timber management may not occur on the Forest, or where modified timber management practices are permissible.

6. Manage to produce timber at a level that will meet short-range and long-range demand projections.

7. Similar to Option 7 under the old-growth associated wildlife habitat issue, search for ways to reduce the polarization and conflict over this issue.

Analysis of the Options

Option 1 - In 1979, the Tongass Land Management Plan provided broad direction for managing the timber program on the Forest. An estimate was made of the timber industry's stumpage needs which would maintain existing employment level at the time. Analysis indicated that 450 million board feet per year would be required to maintain employment; however, considering current economic conditions at the time and the land allocations proposed under TLMP, only 338 million board feet per year was available from normal, operable commercial forest land. The remainder of the timber program level, 112 million board feet per year, was intended to be provided through additional investments for preroading, precommercial thinning, and advanced logging systems technology.

During the implementation of TLMP, there have been questions about the amount of high volume timber stands which have been harvested from the Forest. Some groups have charged that the Forest has been "high-graded" because not enough of the timber cut from the Tongass has come from lands containing low volume stands which require additional investments (preroading) by the Forest Service or purchaser-funded road construction.

The retention provisions of TLMP have been difficult to implement while completing scheduled timber harvests. The retention factors method was designed to protect certain wildlife, fish and visual resources. As discussed previously in this chapter, there have been substantial disagreements between resource specialists on procedures to implement the retention provisions.

TLMP provides very broad programmatic direction where certain activities may occur, including timber harvests. Some people have viewed this direction as adequate, while others believe that sufficient programmatic direction has been lacking, especially when conflicts between timber management activities and other resource uses have occurred.

Option 2 - This option could clarify where timber management would be emphasized. However, this option's effectiveness would be dependent upon the map scale and the accuracy of the descriptions where timber management would be permissible.

Option 3 - Standards and guidelines were not developed when the Tongass Land Management Plan was completed in 1979. This option would provide programmatic direction for timber management activities on the Tongass National Forest.

This option could facilitate issue resolution significantly. Explicit direction could provide the foundation for more consistent timber management activities on the Forest, and reduce controversy between resource specialists involved in Plan implementation. Standards and guidelines, if coupled with mapped management areas (Option 2) which detailed where various resources would be emphasized (e.g., the resources previously managed under retention factors - wildlife, fish, visuals), would provide the public with a more complete picture of how the Tongass would be managed in future years.

Option 4 - Areas which were identified by the public as important for timber management would be managed to provide timber outputs first, and other uses or outputs as compatible. This option would provide a baseline for those people who are concerned primarily with timber management, but do not have specific preferences for other uses of the Forest.

Option 5 - Areas which were identified by the public as not suitable for timber management activities would be displayed in this option. Also, areas where modified timber management activities were desired would be identified. This option would focus on displaying the probable reductions in timber harvest levels that might occur if timber management activities were excluded or modified in these areas. Rather than treating the reduction of timber harvests as a by-product of some other management emphasis, this option would identify where timber management was less important on the Forest. Objectives for timber management would be subordinate to scheduled management activities.

Option 6 - Demand projections for timber indicate a strong demand for timber in Southeast Alaska over the next decade. Demand for Tongass National Forest timber will be at levels at or above those presently being made available. Several Benchmarks (such as max wildlife and max wilderness) indicate that under certain scenarios, this demand could not be met.

Failure to meet projected demand is viewed by some people as an inadequate response to the issue at hand. This option would satisfy the desires of those who think that the Forest should supply enough timber to meet projected demand.

Option 7 - This option would explore ways to reduce the polarization and conflict that presently surrounds the timber harvest and old growth habitat issues. Refer to the discussion on Pages 11 and 12 for an analysis of this option.

Road System What road system should be developed on the Tongass National Forest?

Public Opinion — Public opinion is split between people who want more roads and better connections between existing roads and those people who think that roads destroy the scenic landscape and unique characteristics of Southeast Alaska. Generally, opinions on road system development are strongly held and there is substantial polarization.

Options to Resolve — Some options to resolve this issue include the following:

1. Continue to manage using the direction of TLMP.

2. Identify locations where road construction will occur during implementation of the Revised Forest Plan.

3. Identify locations where road construction will not occur during implementation of the Revised Forest Plan.

4. Search for alternative ways (i.e., new technology) to provide access for management activities which normally require road construction.

5. Identify alternative ways to manage the existing road system.

6. Generate standards and guidelines which provide programmatic management direction for the road system on the Tongass.

Analysis of the Options

Some of the options considered suggest a need for new technology or new ways to do business, rather than a new mix of land allocations which maintain the same kind of management practices.

Option 1 - The direction of TLMP was limited on road system management. Very little direction was provided for coordinating transporation system developments with resource projects. TLMP did provide a goal for road corridors, ensuring that as many of the potential road corridors as possible identified in a cooperative transportation study (Southeast Alaska Multimodal Transportation Study, 1976-79) would be available for development.

Generally, most people believe that the development of a road system on the Tongass, as authorized and directed by TLMP, primarily benefits the timber industry. In fact, there may be other resources that benefit from the development of the transportation system. Option 1 perpetuates the current situation, and does nothing to define road system needs for all resource uses.

Option 2 - This option would clarify where transportation developments would occur. Although it is very unlikely that any one management strategy for transportation developments would satisfy all those interested, this option would provide delineated, identifiable areas where a road system would be provided. The degree of usefulness to issue resolution would depend upon the map scale and the accuracy of descriptions.

This option may require too much site-specific detail to be implementable or useful, especially in a Forest Plan which should be programmatic in nature, not site-specific. However, there may be areas of the Tongass that certain members of the public are extremely interested in; failure to provide adequate programmatic direction for road developments in the Revised Forest Plan for these areas may result in substantial controversies and hinder project implementation.

Option 3 - Similar to Option 2 above, this option would clarify where transportation developments would not occur. Explicitly defining where roads would not be constructed could reduce the concerns of some who oppose road developments.

Option 4 - Changing methods of access could result in changes to some current "standards" for road development. For example, if timber harvest technology changed, there might be a change in the need for a road system to access harvest activities. Less road might be needed or a different standard of road construction might be appropriate. Different road locations might be needed, and

some resource conflicts that may arise from usual road locations would be avoided.

This option is somewhat "futuristic", and leans heavily on change in established practices which have evolved through experience and research. Opportunities to resolve the issue through this option are limited.

Option 5 - This option would explore alternative ways to manage new developments to the road system after resource activities have been completed. Typically, a new road will be used immediately after construction for timber hauling purposes; then, the road may not serve any administrative purpose for several years. Some of the public may feel less strongly about this issue if changes in management direction are taken which de-emphasize the permanence of some roads (e.g., closures, lowered maintenance, etc.).

Option 6 - Standards and guidelines were not developed when the Tongass Land Management Plan was completed in 1979. This option would provide programmatic direction for the development of the Forest road system. This option would clarify what management practices will occur on the Forest, and could facilitate the resolution of this issue.

Minerals

What areas and accessability should be emphasized for the exploration, development, and production of mineral resources?

Public Opinion

Public opinion is split between people who favor exploration for and development of minerals, people who want to perpetuate the current mix of management emphases, and those who want to restrict minerals exploration and development because of concerns for other resources. Similar to the roads system issue, opinions on minerals exploration and development are strongly held and there is substantial polarization on this issue.

Options to Resolve

Some options to resolve this issue include the following:

1. Continue to manage for minerals exploration and development access using the direction of TLMP.

2. Provide specific locations (mapped) which will be managed for access for minerals exploration and development.

3. Generate standards and guidelines which provide programmatic management direction on access for minerals exploration and development.

4. Mesh access for minerals exploration and development with other compatible land allocations.

5. Emphasize access for minerals exploration and development where the public identified important mineral deposits. Provide this emphasis through land allocations and making other resource uses subordinate to the minerals exploration and development.

6. Identify where access for minerals exploration and development will be precluded by management allocations for other resources.

Analysis of the Options

The abundant mineral wealth on the Tongass is well documented. Increasing interest in minerals exploration and development has intensified the conflicts over access for minerals exploration and development.

Option 1 - TLMP provided minimal direction for the management of minerals. Generally, the Plan relied on applicable laws and regulations to provide the programmatic direction for site-specific analysis. Access in wilderness areas (LUD 1) was addressed very briefly.

The focus of this issue may be more on re-examining the allocations of TLMP rather than the direction of the Plan; resultantly, the existing direction, although limited, may be adequate for resolution of the issue.

Option 2 - This option could clarify where access for minerals exploration and development would be provided.

Option 3 - Standards and guidelines were not developed when the Tongass Land Management Plan was completed in 1979. References were made to applicable laws and regulations instead. Explicit standards and guidelines may prove useful to issue resolution.

Option 4 - The potential to resolve the minerals issue may be linked to how other issues are resolved, particularly the wilderness issue. Generally, wilderness allocations and designations result in withdrawals from exploration and development activities for minerals, as do "wild" river portions of wild and scenic river designations. Most other resource uses do not usually result in withdrawals.

Option 5 - Under this option, areas of the Tongass which are important to the public for minerals exploration and development activities would be identified. Minerals exploration and development would be emphasized, and other resource uses would be permitted if compatible with minerals exploration and development.

This option could be useful to issue resolution, if the primary focus of the issue is on allocation of land to either a withdrawal or non-withdrawal type of management prescription.

Option 6 - Similar to the analysis of Option 5, this option could be useful for addressing where withdrawals should occur.

Roadless Lands

What areas and what amount of roadless lands should be recommended for wilderness designation and what kinds of uses should be permitted?

Public Opinion

As stated, the issue question has three different parts. The "What amount of roadless areas..." portion of the issue is broad in scope, and public opinion varies widely. The differences among various interest groups are strongly held, and a compromise position will not come easily.

The "What areas..." portion of the issue may be more easily addressed because the focus of the decisions to be made will be on specific areas of the Forest, rather than a broad policy decision on roadless lands. However, the large number of roadless areas on the Tongass may complicate the situation. There may be very intense interest in each roadless area; however, only a few people may feel

strongly about each area because of the large number of areas under consideration.

Public opinion is mixed on what kinds of uses should be permitted throughout wildernesses and roadless lands in Alaska. Some people think that wilderness areas should be pristine, and no signs of permanent human presence should be visible. Others believe that some traditional uses of areas now designated as wilderness should be permitted, regardless of conformance with current wilderness regulations or management policies.

Options to Resolve

Some options to resolve this issue include the following:

1. Continue to manage using the direction of TLMP.

2. Generate standards and guidelines which provide programmatic management direction for permitted uses of wilderness on the Tongass.

3. Mesh recommendations for wilderness designation with other compatible land allocations, resource demands, and public desires for other resource uses.

4. Emphasize wilderness recommendations where the public identified the need for designation. Provide this emphasis through land allocations.

5. Manage for levels of wilderness that will adequately meet short-range and long-range demand projections.

Analysis of the Options

Option 1 - TLMP identified broad allocations and management objectives for the Tongass National Forest. If the management direction of TLMP was continued, then no change in land allocations would occur, i.e., no recommendations for additional wilderness would occur. Management of permitted uses would not change.

Some people want the land allocations for wilderness to be changed, while others want more specific management direction (i.e., standards and guidelines) which details what kinds of uses will be permitted in wilderness. Continuing to manage using the direction of TLMP would probably not satisfy the concerns of these people.

Option 2 - Standards and guidelines were not developed when the Tongass Land Management Plan was completed in 1979. This option would provide programmatic direction for wilderness, and perhaps clarify what uses were permitted in wilderness.

While this option might resolve the "How to" portion of the issue, the "How much" and "Where to" portions of the issue would not be resolved. Some people want to revise the land allocations of TLMP, and providing additional direction without changing the land allocations will not resolve their concerns.

Option 3 - The potential to find an acceptable solution to this issue is linked to how other issues are resolved. Areas recommended for wilderness generally provide high quality wildlife habitat and scenic quality, among other resource outputs. Areas managed for wildlife habitat or scenic quality may have the same physical characteristics as areas managed for wilderness; the only difference may be the actual designation as wilderness. Ensuring that enough land is maintained in an undeveloped character may be achieved through alternate ways, rather than

through wilderness recommendation and designation only. However, some people may view any action other than wilderness recommendation/designation as inadequate.

Option 4 - Areas which were identified by the public as important for wilderness would be recommended for wilderness designation by Congress. This option would provide a baseline for those people who are concerned primarily with wilderness, but do not have specific preferences for wildlife habitat or other uses of the Forest that result in maintenance of the existing wilderness character.

Option 5 - To resolve this issue, it is essential that enough wilderness be provided to meet or exceed existing and future demand for wilderness experiences. However, arriving at an estimate of demand is very difficult because people have different reasons for wanting wilderness; some want wilderness for recreational purposes, while other people are concerned about global warming or overcrowding of the Earth and simply want legislated protection for some pieces of the nation.

Because demand is difficult to identify, issue resolution becomes problemmatic. Land managers search for ways to provide enough wilderness to satisfy demand, but without a clear determination of demand, the answer is never apparent to the question "How much is enough?" An excess of wilderness opportunities may need to be maintained in the short-term to meet projections of future demand.

As detailed in the Max Wilderness Benchmark, 15.8 million acres of wilderness could be provided.

Local Lifestyles

What should the Forest Service do to provide for the local lifestyles of Southeast Alaska communities?

Public Opinion

Most of the people residing in Southeast Alaska are concerned about the management of the Tongass for a variety of reasons. Typical reasons include direct employment which is generated from the use of Forest resources, indirect employment which is generated from others who work on the Forest or come to visit, recreational activities on the Forest, or subsistence activities which provide food or materials.

Often, the resources of the Tongass play a very important role in maintaining the existing lifestyles of Southeast Alaska residents. Much of the employment in the timber industry in Southeast Alaska is dependent upon timber harvesting on the Tongass National Forest. Similarly, people employed in commercial fishing are dependent upon the fish produced from lakes and streams on the Tongass. People who live primarily on a subsistence basis are dependent upon the resources of the Tongass for their food and materials for other subsistence activities. Most residents of Southeast Alaska have favorite places on the Tongass where they go for recreational activities.

People often view any change to their lifestyle as a negative effect, especially if the change was not by their choice. Significant changes in management practices on the Tongass (e.g., timber harvest level, recreation opportunities, fish habitat management, etc.) may result in lifestyle changes for some of the residents of Southeast Alaska.

The current mix of management practices on the Tongass provides for timber harvesting, fish production, recreational activities, and other uses of the Forest. Some resource uses are compatible and some are competitive. Where

resource uses are not compatible, generally, there is some conflict between the lifestyles of some Southeast Alaska residents who are engaged in the incompatible uses of the Forest. Public opinion reflects this conflict.

Options to Resolve

Some options that may assist in issue resolution have been developed. They are as follows:

1. Continue to manage using the direction of TLMP.

2. Provide programmatic direction in the Revised Plan which requires all site-specific project-level analyses to consider effects on local lifestyles.

3. Provide resource output levels that are equal to average output levels of recent years.

4. Provide resource output levels that are within a given percent (either more or less) of average output levels of recent years.

5. Identify key resource output levels which are indicative of the effects of Forest management activities.

Analysis of the Options

This issue is very complex. It is likely that some people could be affected by any decision that is made about the Tongass. People often become emotionally affected when their livelihood or their lifestyle changes due to factors beyond their control. Typical reactions include anger, fear, sadness, or confusion.

<u>Option 1</u> - TLMP resulted in broad land allocations which have supported a range of resource outputs during the Plan period. Although extensive programmatic direction (standards and guidelines) was never completed to guide Plan implementation, diverse lifestyles have been maintained throughout Southeast Alaska during the past 10 years, many which are dependent upon the resources of the Tongass.

As the Revised Plan is developed, a central question is whether the current allocations of land should be changed (e.g., should some land that is presently managed for commodity production be recommended for wilderness). The answer to this question has a very significant impact on the lifestyles of many residents of Southeast Alaska communities. As land allocations change, output levels for some resources may change.

Another question that is being addressed in the revision of TLMP is whether the management direction of the Plan should be changed (e.g., should standards and guidelines be included in the Revised Plan which direct how resources will be managed within existing allocations). This question focuses on the need to clarify or modify existing management direction, rather than addressing which lands should be allocated to specific management prescriptions.

This option provides an important reference point for evaluating the effects that may result from changes in land allocations. In resolving this issue, it is important to be able to identify and analyze the degree of change that may result in Southeast Alaska communities as a result of management decisions for the Tongass National Forest. Maintaining the current allocations and management direction of TLMP would seem to perpetuate the lifestyles that residents of Southeast Alaska communities presently experience.

Option 2 - Currently, no Forest-wide direction is provided for considering the effects of plan implementation on the local lifestyles of communities. Providing programmatic direction for project level analysis may result in less disruptions to lifestyles because of more informed and considered decisions.

Option 3 - This option would maintain the average annual resource outputs of the last 10 years, while allowing the land allocations and the management direction to change. So, while land allocations may vary, some outputs which are critical (e.g., employment-related, etc.) to the maintenance of livelihoods and lifestyles would stay the same.

This option would facilitate changes in land allocations that were appropriate and responsive to public desires, but still maintain the lifestyles and employment opportunities of recent years.

Option 4 - This option would provide some flexibility for land allocation or management direction changes by determining a range of possible resource output changes, within which negligible effects on lifestyles to Southeast Alaska communities would occur. By limiting the change in resource outputs to a tolerable level, lifestyles and employment would generally be maintained while additional flexibility in changing land allocations and management direction might be available.

Option 5 - Changes in some resource output levels may be indicative of the effects that would occur in Southeast Alaska communities as a result of changes in Forest management activities. For example, if the 1989 timber harvest level drops by 20 percent, then employment in timber-related industries may drop by 560 jobs. Lifestyles in several communities would likely be dramatically affected.

Identifying key resource outputs may better define the relationship between the changes that may occur to local lifestyles in Southeast Alaska and certain types of resource management decisions. To summarize, some resource management decisions and land allocations may be more critical to the maintenance of Southeast Alaska lifestyles than others.

CHAPTER 7
NEED FOR CHANGE

CHAPTER 7 - NEED FOR CHANGE

INTRODUCTION

The final step in the analysis of the management situation is determining the need to consider change in management direction. Management direction, in this context, includes goals, objectives, standards and guidelines, prescriptions, land allocations, allowable sale quantity, and evaluation of monitoring results. This step is a key factor in determining what alternatives to consider to current plan direction.

In accordance with regulations (36 CFR 219) and national policy 1/, components of the need for change consideration include: results of monitoring and evaluation; current direction; resource potential; projections of demand; and potential to resolve issues and concerns. Some examples of factors that may lead to a change in management direction include market conditions, public values or demands, and new information concerning resource interrelationships.

Pending national legislation is indicative of the public's interest in considering change to management direction for the Tongass. Similarly, a proposal which was generated by some of the elected local community officials in Southeast Alaska (Southeast Conference Committee) also suggests a need to consider a change in management direction. The public issues identified in 1988 (see Chapter 2) indicate that the management situation may require adjustment in the Tongass Land Management Plan (TLMP).

THE NEED FOR CHANGE

The need for change has focused on evaluating the Tongass Land Management Plan of 1979 (and subsequently amended in 1986) in relation to factors discussed above, and determining how this Plan could or should be revised to respond to identified public issues and management concerns. The need for change determination has resulted in a point by point examination of the previous decisions and direction of TLMP, and the adequacy of those decisions today. Results of this determination follow.

Multiple-use goals and objectives

1. The management goals and objectives of the Tongass Land Management Plan need updating. Changes in management goals and objectives of the Tongass Land Management Plan may help in responding to and resolving issues and concerns that have been identified in the analysis of the management situation.

Management Prescriptions

2. The Tongass Land Management Plan developed four land designations providing the framework for allocation decisions (i.e., what areas to manage as roadless or for timber production). Explicit multiple-use management prescriptions with accompanying standards and guidelines (see next section) were not presented in the Plan. (Prescriptions are sets of coordinated management direction applied to specific areas of land. They would be much more specific to types of areas and individual resource needs than are the TLMP land use designations.)

More specific prescriptions may provide the opportunity to better manage for and recognize individual resources in a multiple-use context, or to recognize special needs for resources in specific areas. For example, recreation use on the Tongass is generally concentrated in areas where a combination of good access, scenic quality and recreation opportunity are found. More specific prescriptions would provide the means to recognize these areas and manage them specifically for their recreation values. Having management prescriptions designed to maintain specific recreation settings would alleviate this situation. There are other concerns about resources, such as fish, riparian, visual and wildlife, that can

be addressed by more specific prescriptions. More specific management prescriptions would also provide the opportunity to be more responsive to emerging public issues such as old growth.

The mix and pattern of land allocations is also at issue with some of the interested public wanting to ensure an adequate timber supply, and others wanting less harvest and more land allocated to maintain its wildland character. The pending legislation is also an indicator to consider adjustment to current management direction.

Standards and Guidelines

3. Standards and guidelines, to specify how projects and activities are to be carried out to satisfy multiple resource needs, are found in several documents, not just TLMP. Other planning documents such as the Southeast Alaska Area Guide, which established some management direction, were referenced in the Tongass Plan, and various project implementation documents which followed the Plan included some standards and guidelines. There also have been subsequent changes in Regional direction in the forms of handbooks and manual supplements. (One example is the Aquatic Habitat Management Unit Handbook.) Revising the Forest Plan provides an opportunity to aggregate management direction of these various documents into a more complete package, at the same time validating, updating and adding to these existing standards and guidelines as needed.

As with the prescriptions discussed above, the opportunity exists to have coordinated standards and guidelines to recognize and address specific resource needs when implementing projects.

The analysis in Chapter 3 indicates that many individual resources cannot be protected or maintained effectively without standards and guidelines recognizing their specific needs. Cultural resources, fish, lands (special uses), recreation, soils, riparian areas, transportation, visual quality, water, wilderness and wildlife are all in this category. During project planning (for instance, a timber sale), standards and guidelines can be applied for all potentially affected resources, thus providing a means to more effectively minimize impacts and ensure environmental quality.

A lack of coordinated standards and guidelines has also made it difficult for the Forest to address emerging issues such as biodiversity and old growth.

Timber Suitability

4. In the land use allocations of the Tongass Land Management Plan, some lands were made available for a variety of multiple uses (land use designations 3 and 4), including timber production. Three aspects in managing these lands have made it difficult to determine the actual amount of land considered suitable for timber production.

The first of these, the retention factors method described above, was designed to retain 278,000 acres of commercial forest land in a condition beneficial for other resources like wildlife, but has proved to be difficult to implement.

Second, as project proposals were considered during the implementation phase of TLMP, many Value Comparison Units (VCU's) were not entered due to public pressure to maintain their wildland character. Thus many LUD 3 and 4 VCU's have actually been managed as LUD 2.

Third, almost 900,000 acres, while identified as available commercial forest land, were in a "difficult to manage" or "isolated" category. During

implementation, very few of these acres have had timber harvest activities for a variety of reasons. Revising the Forest Plan provides an opportunity to readdress the determination of suitable and available forest lands for timber

Allowable Sale Quantity

5. The Tongass Land Management Plan established an anticipated output range for timber volume to be sold or released from the Forest (the "allowable sale quantity"). This output range was designed to be responsive to the demands of the southeast Alaska timber industry, which is largely dependent upon raw materials from the Tongass National Forest, and to provide a significant contribution to employment in southeast Alaska. When TLMP was approved in 1979, the timber industry was an important part of the Southeast Alaska regional economy. Although employment has fluctuated over the decade, this situation has not changed significantly during implementation of the Plan.

The overall employment picture in Southeast Alaska's timber industry is expected to change in the coming decade. During the 1980's, Native corporations produced timber from their lands at rates much higher than they will be able to sustain in the future. Nearly all of the Native Corporations are expected to sharply reduce harvest levels in the next 2-3 years. At the same time, demand is at near record highs. Projection of demand remains strong well into the 1990's.
At the same time, there is a segment of the interested public who believe timber harvest levels should be reduced on the Tongass. They would like to see more of the tentatively suitable forest lands retained in a wildland character and not harvested.

Demand projections, public interest, and contribution to local employment describe the need to revaluate the allowable sale quantity.

Monitoring and Evaluation

6. The Tongass Land Management Plan provided direction for monitoring and evaluation, primarily for monitoring development-related activities. Revisions to the monitoring plan will be needed to be responsive to the revised management prescriptions and standards and guidelines. Updating the monitoring and evaluation requirements will facilitate evaluation of the Revised Forest Plan as implementation proceeds.

Conclusion

The need for change determination does not commit to any particular action. The "no-action" alternative (current management direction) is a viable alternative that is logical and necessary to consider in detail. The findings merely suggest the kinds of adjustment to the current management direction that need consideration .

1/Letter from James C. Overbay, Deputy Chief, to Michael A. Barton, Regional Forester, R-10, dated 8/1/89.

LIST OF PREPARERS

LIST OF PREPARERS

Robert C. Aiken

Transportation Planner

Contributions made:
Coordinated transportation and facilities input, including log haul costs, future road density estimates, log transfer facility inventory, and facility needs.

Education:
B.S. Forest Engineering, Oregon State University, 1980.

Forest Service: 9 years
Transportation Planner, Tongass National Forest, Stikine Area, 1984-present
Forester, Siuslaw National Forest, 1980-84

Other relevant employment:
Cooperative Education Student, Siuslaw National Forest (2 years)
Forestry Aid, Siskiyou National Forest (2 seasons)

Arnold J.Albrecht

Regional Recreation, Wilderness and Trails Management Specialist

Contributions made:
Coordinate the writing of the Draft Wilderness AMS

Education:
BS Forest Management, Humboldt State University, 1962
Forest Service Recreation Short Course, Clemson University, 1982

Forest Service: 27+ years
Provide leadership technical support and training for the recreation, wilderness and trails management programs in the Alaska Region. R10 Regional Office, Juneau, AK. 3 1/2 years.
Forest Recreation Staff Officer, Chugach National Forest, Anchorage, AK, 12/80 to 3/86.

Other Forest Service Experience:
Special Land Uses Staff Officer, Lake Tahoe Basin Management Unit, South Lake Tahoe, CA., 11/78 to 12/80.
Recreation Officer responsible for managing the John Muir and the Minarets Wildernesses on the Mammonth Ranger District of the Inyo National Forest, Mammoth Lakes, CA. 9/74 to 11/78.
Recreation and Resource Officer, Downieville Ranger District, Tahoe National Forest, Downieville, CA. 5/71 to 9/74.
Recreation Assistant, Pineridge Ranger District, Sierra National Forest, Big Creek, CA. 2/68 to 5/71.
Forester (GS460-5 thru 9), Hayfork Ranger District, Shasta-Trinity National Forest, Hayfork, CA. 6/64 to 9/67.
Forestry Aid/Technician Seasonal Employee on the Sequoia, Inyo, and Six Rivers National Forests from 1956 thru 1961.

Other Relevant Employment and Experience.
Employment outside the Forest Service: US Army , 2/62 to 1/64.
Professional Organizations: Secretary of the Alaska Recreation and Park Association, 10/89 to present.

David Arrasmith — Economist/Analyst

Contributions made:
- Economic Analysis,
- FORPLAN analysis

Education:
- B.S. Agricultural Economics, University of California Davis, 1981

Forest Service: 9 years
- Economist/Analyst Alaska Region, 2 years
- Economist/Sociologist Eldorado National Forest, 7 years

John T. Autrey — Archaeologist

Contributions made:
- Cultural Resource Management

Education:
- B.A. Anthropology, Univ. of Northern Colorado 1973.
- M.A. Anthropology, Univ. of Northern Colorado 1973.

Forest Service: 7 years
- 1987-Present: Ketchikan Area, Tongass National Forest, R10, Area Archaeologist
- 1984-1987: Kaibab National Forest, R-3, Ass't. Forest Archaeologist
- 1982-1984: Chatham Area, Tongass National Forest, R10, Archaeological Technician.

Norene Blair — Writer-Editor

Education:
- B.A. Planning and Administration, University of Oregon, 1968.
- M.A. Planning and Administration, University of Oregon, 1970.
- M.S. Forest Management (Silviculture), University of Idaho, 1977.
- Pre-doctoral Studies, Forest Entomology, University of Idaho

Forest Service: 13 years
- Writer-Editor, Supplemental EIS, Alaska Pulp Corporation Long-term Sale Contract (SEIS)
- Land Use Coordination, Columbia River Gorge National Scenic Area
- Writer/Editor/Indexer - Detailer - Ochoco, Siskiyou, and Malheur NF (2 years)
- Forester, Sale Planner/Logging Systems Specialist, Malheur NF (2 years)
- Environmental Coordinator, Burns Ranger District (3 years)
- Forester/Data Base Specialist, Planning Team, Malheur NF (4 years)

Other Employment:
- Instructional Assistant, Resource Economics, University of Idaho, 1974-77.

Tom Bobbe — Forester

Contributions made:

Contributed to the development of the GIS database for the Ketchikan Area. Coordinated the automation of the vegetation layer into GIS. Also coordinated the development of the timber operability inventory and the automation into GIS.

Contributed to the development of the standards and guidelines for riparian management.

Education:

Bachelor of Science Forestry 1975
Master of Forestry Forest Engineering 1983

Forest Service: 15 years

Assistant to the Ketchikan Area Timber Staff Officer - 7 years
Logging Systems Specialist R6 RO - 2 years
Forester Stikine Area - 6 years

Paul Bradford — **Documents Team Coordinator**

Education:

B.S. Forest Management, Ohio State University, 1977
M.S. Forest Management, Oregon State University, 1986.

Forest Service: 10 years

Planning Specialist, Regional Office, Alaska Region (1 year)
Economist, Malheur NF (5 years)

Steven A. Brink — **Tongass Land Management Plan Revision Team Leader**

Contributions made:

Oversight to insure that NFMA, NEPA laws, and implementing regs for Forest Planning are met.

Education:

B.S. -ivil Engineering, University of California, Davis 1971.

Forest Service: 20 years

Land Management Planning and Engineering Staffs, Washington, D.C. (1 year)
Engineering Staff, Regional Office, San Francisco, CA (2 years)
Engineering Staff, Chatham Area, Tongass NF (4 years)
Logging Systems Specialist, Stanislaus NF (3 years)
Transportation Planner, Six Rivers NF (4 years)
Sanitation Engineer, Inyo NF (1 year)
Transportation Engineer, Eldorado NF (5 years)

Janis Burns Buyarski — Detailer for Wilderness ratings

Contributions made:
Worked as a detailer for three weeks preparing narrative reports for wilderness ratings on the Stikine area.

Education:
B.S in Forestry, University of Illinois, Urbana campus, 1977

Forest Service Employment: 11 years
Planning Team Leader, Stikine Area, Tongass NF, (10 mos)
Management Systems Program Manager, Stikine Area, Tongass NF, (2 years)
Timber Sale Contract and Appraisal Specialist, Stikine Area, Tongass NF (2 yrs)
Pre-sale Forester, Wrangell RD, Stikine Area, Tongass NF (1 year)
Pre-sale Forester, Idaho City RD, Boise NF, (3 years)
Forestry Technician, Sault Ste Marie RD, Hiawatha NF, (2 yrs)

Other Relevant Employment:
Consulting Forester, self employed (18 months)

Deirdre P. Buschmann — Landscape Architect

Education:
Bachelor of Landscape Architecture (B.L.A.), University of Washington, 1980.

Forest Service: 8 1/2 years
Forest Landscape Architect, Tongass NF, Stikine Area July 1985 to Present
Landscape Architect, Tongass NF, Stikine Area, June 1981-June 1985
Engineering Draftsman, Tongass NF, Stikine Area, Feb 1981 - June 1981.

Forrest Cole — Timber/Subsistence Coordinator

Contributions made:
Timber and Subsistence portions of the Technical AMS
Juneau/Admiralty Timber & Lands Layers, GIS.

Education:
B.S. Forestry, Northern Arizona University.
Forest Engineering Institute

Forest Service: 17 years
4/1989 - Present - Timber/Subsistence Coordinator, TLMP Revision.
1983-1989 - Timber, Lands, Minerals Staff, Juneau Ranger District, TNF
1980-1983 - Small Sales Forester, Petersburg R.D. Tongass National Forest
1979-1980 - Presale Forester, APC Long-term Sale, Petersburg R.D., Tongass National Forest.
1977-1979 - Presale Forester, Coconino National Forest, Region 3.
1971-1977 - Fire Control, Coconino N.F.

Linda Christian

Recreation Forester

Contributions made:
Added and rewrote sections of the Wilderness plans.

Education:
Humboldt State University, 1977, Forestry.

Forest Service: years
Recreation Planner, in charge of trail maintenance, cabins, recreation sites and inventory of Wilderness Areas.

Other Relevant Employment.
Avid backpacker and kayaker and has traveled in both wildernesses which she wrote about.

Judy Coose

Administrative Assistant

Contributions made:
Have established and maintained administrative record.
Have provided support system for the team in accomplishing their goal.

Education:
High School, some college credits, and a lot of on-the-job training.

Forest Service: 8 years
Administrative Assistant, TLMP Revision Team, Juneau Alaska
Engineer Staff Clerk, Supervisor's Office, Ketchikan, Alaska
Support Service Specialist, Supervisor's Office, Ketchikan AK

Other Employment:
Social Security Administration - 4 years, doing data control, and public involvement.

Cecilia C. Curtis

Clerk-Typist III

Contributions made:
Updated planning and administrative record by inputting Datalib.

Education:
High School Diploma, 1963.

Forest Service: 1 year.
Clerk-Typist, Management Services, Regional Office, Alaska Region

Other Relevant Employment:
Legal Assistant for a law firm, 15 years.

John Day

Forplan Analyst

Contributions made:
Forplan modelling

Education:
B.S. Forest Management, Colorado State University.
M.S. Operations Research/Forestry, Colorado State University.

Forest Service: 2 years
2 months with TLMP
Previously with TM/LMP Systems Section, Washington Office (Detached), Ft. Collins, Colorado.

Eugene J. DeGayner

Resource Information Manager

Contributions made:
Coordinate GIS activities
Oversee the development of a forest-wide data base for the Revision.

Education:
B.S. Wildlife Biology, University of Minnesota, 1980
M.S. Wildlife Biology, University of Minnesota, 1982

Forest Service: 6 years
Wildlife Biologist, Tongass National Forest, Ketchikan Area (6 years)

Ronald R. Dippold

Oracle Specialist

Education:
Rose-Hulman Institute of Technology, 3 years towards BS in Electrical Engineering and BS in computer science.
University of Alaska (1981-1985) 35 credit hours, Computer Science, Math, and English.

Forest Service: 1 year
Volunteer 1987 TLMP (3 months)
Volunteer Computer Specialist (3 months)

Other Employment:
President and owner - Computer Consulting Firm 1980-1989.
Computer Specialist, State of Alaska, ADF&G, and Legislative Affairs 1984-1988.

Maria S. Dudzak — **Planning Assistant**

Education:
- B.S. Geography, University of California, 1985.

Forest Service: 4 years
- Planning Assistant, Regional Office, Alaska Region, Juneau, Alaska
- Secretary to the Director, Forestry Sciences Laboratory, PNW Research Station, Juneau, Alaska (1 year)
- Forest Guide, Regional Office, Alaska Region, Juneau, Alaska (2 years)

Other Relevant Employment:
- Cartographic Technician, USDA Soil Conservation Service, 1985.
- Geologic Aide, Bureau of Land Management, 1984.

Dick Estelle — **Planning Staff Officer - Stikine Area**

Contributions made:
- Assist in coordinator of IDT activities with the Stikine Area Management Team
- Assist IDT in formulating procedures and processes

Education:
- B.S. Horticulture, Landscape Construction & Maintenance, Oregon State University, 1979.

Forest Service: 20 years
- Planning Specialist, Stikine Area, Tongass NF (10 years)
- Forest Landscape Architect, Stikine Area, Tongass NF (5 years)
- Forest Landscape Architect, Kootenai NF (4 years)
- Assistant Landscape Architect, Siuslaw NF (1 year)

Other Relevant Employment:
- Grade School and High School Teacher - State of Alaska, 1965-66.

Theodore W. Falkner — **GIS Coordinator, Chatham Area, Tongass NF**

Education:
- Humboldt State, Forestry, 1956-60.
- Humboldt State, Civil Engineering, 1960-62
- LA State, Los Angeles, Civil Engineering, 1964-66.

Forest Service: 30 years
- Transportation Planning, Small Data Base Design and Maintenance, GIS Coordination, Tongass NF 1982-Present.
- Transporation Planner and Logging Engineer, Klamath NF 1970-1982.
- Transportation Planner, Logging Engineer, Sequoia NF, 196-1970
- Survey Technician, Design Engineer, Angeles NF 1962-1966.
- Survey Technician, Klamath NF, 1958-1962.

Michael E. Fox

Planning Assistant, Chatham Area

Contributions made:
Prepared roadless area evaluations

Education:
B. S., Forest Management, Utah State Univ.

Forest Service: 17 years
Tongass N.F., Chatham Area, Planning Asst. (1 year)
Malheur N.F., Forester, (9 years)
Klamath National Forest, Forester (2 years)
Kiabab N.F., Forester (2 years)
Deschutes N.F., Forestry Tech. (1 year)
Stanislaus N.F., Forestry Tech. (2 years)

Other Relevant Employment:
U.S.A.C.E., Ft. Worth Engineering District, Forester (3 years)

Ron Freeman

Forester; Support specialist on TLMP

Contributions made:
Writing and editing of roadless reports; Editing Wilderness AMS's, Stikine Area

Education:
B.S. in Forestry , University of Washington, 1976

Forest Service Employment: 20 years
Recreation Staff, Stikine Area, Tongass NF (6 months)
Resources Forester, Randle Ranger District, Gifford Pinchot N.F. (9 years)
Forestry Technician, Oakridge Ranger District, Willamette N.F. (11 years)
Details to: Wenatchee N.F.(White Pass Ski Area EIS), Mount St. Helens National Volcanic Monument (Rec Staff), Hells Canyon NRA (Recreation Planning)

Other Relevant Employment:
One year of seasonal employment with the National Park Service in several locations. Seasonal employment with Forest Service in several locations.

Charles R. Gass

Planning Staff Officer, Ketchikan Area, Tongass NF (Retired)

Education:
B.S. Soil Science, University of Tennessee, 1958
M.S. Soil Science, University of Tennessee, 1961

Forest Service: 28 years
Planning Staff, Tongass National Forest, Ketchikan Area (13 years);
Planning Team Leader, Ketchikan Area (5 years).
Soil Scientist, Ketchikan Area 7 years.
Soil Scientist, Daniel Boone NF, Ky (2 years)
Soil Scientist, Monongahela NF, W. Va. (1 year)

Other employment: Research Assistant University of Tennessee 1958-61.

Susan Gorder — **Engineering Tech.**

Contributions made:

My contributions include automating and editing Chatham data layers; running macros designed to assimilate, query and display data; running quality checks on queried data and updating where necessary.

Education:

A.A. - Engr. Technology, 1982

Forest Service: 3 years

I am currently working in GIS at the Chatham S.O. in Sitka, AK. I've been in this position for one year. My responsibilities include the administration of the GIS database on the Chatham Area and support work for both TLMP and the S.O. SEIS team. I create and run macros designed to query and/or display GIS data. I direct the activities of 1-3 persons editing and automating GIS data layers and act for the GIS Coordinator in his absence. Engineer technician, Forest Service, 1982-84.

Other Relevant Employment:

State of Alaska

Charlotte Greenfield — **Computer Programmer Analyst, GIS**

Contributions made:

Wrote and/or debugged several of the standard computer macros for analyzing the GIS information. Wrote documentation and user instructions for running the macros on the Areas. Spearheaded the Stikine Area effort to complete all of the preliminary computer analysis steps prior to sending data to the Team.

Forest Service: 12 years

GIS Computer Analyst, Stikine Area, Tongass N.F. (2 years)
Computer Programmer, Stikine Area, Tongass N.F. (6 years)
Draftsman, Planning, Stikine Area, Tongass N.F. (4 years)

Other Relevant Employment:

Title Searcher, Safeco Title Ins., Eugene, Oregon.

Rick Griffen — **Computer Programmer Analyst**

Contributions made:

Database Management

Education:

B.S. M.S. Wildlife Management; Humboldt State University, 1983.

Forest Service: 2.5 years

David M. Hatfield, Jr Geologist

Education:
B.A. Geology/Outdoor Education, Evergreen State ege, 1978.
M.S. Geology, Western Washington University, 19

Brad L. Hunter **Recreation Forester**

Contributions made:
AMS - Wilderness for Petersburg Ranger Distr t

Education:
Purdue University, B.S. Forest Management, 1978

Forest Service: 12 years

Steven Kessler **Fish Biologist**

Contributions made:
Summarized fish habitat situation on the Tongass, including production coefficients
Participated in the Development of the Forest-wide GIS database
Managed public scoping database, nd analyzed public comments.

Education:
B.S. Biological Sciences, University of Arizona, 1974.
M.S. Ecology and Evolutionary Biology, University of Arizona, 1978.

Forest Service: 9 years
Fish Biologist, Tongass NF, Tongass Forest Plan Revision Interdisciplinary Team, Juneau. 1987-present
Forest Fish Biologist, Wenatchee National Forest, 1983-1987.
Fish Biologist, Tongass National Forest, Chatham Area, Juneau Ranger District, Yakutat Work Center. 1980-82.
Fish Biologist, Tongass National Forest, Chatham Area SO, 1980.

Other Relevant Employment:
Planner, Alaska Department of Fish and Game, FRED Division (on IPA assignment from Forest Service to ADF&G), 1982.
Fish Technician, USDI, Bureau of Land Management, Boise, Idaho, Summer 1979.
Hydrology Technician, USDI Bureau of Land Management, Worland, Wyoming, Summer 1978.
Research and Teaching Assistant, University of Arizona, 1975-1978.
Instructor, Pima mmunity College, Tucson, AZ, 1977-79.

Annemarie LaPalme

Forester

Contributions made:
- Updated AMS for West Chichagof/Yakobi and South Baranof Wildernesses.

Education:
- B.S. Forest Management 1980

Forest Service: 10 years
- Forester, Recreation, Sitka Ranger District, Chatham Area, Tongass National Forest, 1 year.

W. David Loggy

Soil Scientist
Certified Professional Soil Scientist since 1977.

Function on Revision Team:
- Team member covering watershed and air resources

Contributions made:
- Establish and hold watershed watershed task forces.
- Established watershed and air standard and guidelines.
- Municipal Watershed prescription.
- Established wetland identification, classification and delineation.
- Watershed input into riparian prescriptions.
- Watershed and air sections of AMS.

Education:
- AA degree, Casper Junior College, 1961
- B.S. Range Conservation, Colorado State University, 1966

Forest Service: 24 years
- Soil Scientist, Tongass National Forest, Ketchikan Area (16 years)
- Soil Scientist, San Juan National Forest, Supervisor's Office (7 years)
- Range Technician, Wallowa-Whitman (1/2 year)
- Range Aid, Medicine Bow National Forest, Thunder Basin National Grassland (1/2 year).

Willard D. Lowe

Resource Assistant, Wrangell Ranger District

Contributions made:
- Rewrote sections 1 and 111 of AMS for Stikine-LeConte Wilderness Area.

Education:
- B.S. Forest Management, Washington State University, 1967.

Forest Service: 23 years:
- Recreation, Wilderness, and Lands on the Wrangell Ranger District (9 years)
- Resource Management Assistant (RMA) on Wrangell RMA unit of the Stikine Area (4 years)
- Fifteen years experience in Region 10, thirteen of it on the Wrangell District/RMA Unit, participated in Original TLMP.

Other Relevant Employment:
- Eight years experience in Region 1 on two forests, three districts, and an S.O.

Marti M. Marshall — Recreation Specialist/Planner

Education:
- B.A. Multidisciplinary Social Sciences, Michigan State University, 1976

Forest Service Employment: 11 years
- Recreation Specialist, Tongass National Forest, Chatham Area (2 years)
- Recreation Technician, Tongass National Forest, Juneau Ranger District (2 yrs.)
- Recreation Technician, Mt. Hood National Forest, Columbia Gorge Ranger District (7 years)

Charles E. McConnell — Recreation Planner

Education:
- B.S. Forest Recreation, Colorado State University, 1957

Forest Service (32 yrs)
- Regional Recreation Planner, Alaska Region (2 years)
- Recreation and Wilderness Planning and Management, Rocky Mountain Region (7 years)
- Winter Sports Specialist, Rocky Mountain Region (4 years)
- Forest Planning Team Leader, Arapaho/Roosevelt NF's (1 year)
- Forest Resource Staff Officer, Grand Mesa-Uncomphagre and Arapaho NF's (10+ years)
- Recreation Forester, Black Hills NF, White River NF (8+ years)

John Morrell — Lands Specialist, Law Enforcement Specialist

Education:
- B.S. Forestry, University of Montana, Missoula, 1967
- M.S. Forestry, California State University, Humboldt, 1976
- Master of Forest Resources, Outdoor Recreation Emphasis, University of Washington, 1977

Forest Service: 11 years +
- Lands Forester, Tongass N.F., Chatham Area (4 years)
- Resource Assistant, Thorne Bay R.D. (2 years)
- Resource Assistant, North Prince of Wales R.D. (2 years)
- Forester/Recreation Assistant, Packwood R.D. (2 years)
- Forester, Packwood R.D. (1 year)
- Forestry Technician, Packwood R.D. (3 months)

Other Relevant Employment:
- Research Assistant, University of Washington/PNW Experiment Station (1.5 years)
- Recreation Technician, Bureau of Land Management, Ukiah, CA (3 months)

Connie G. Myers — Public Affairs Specialist/Social Scientist

Contributions made:
- Public Involvement
- Writer/Editor

Education:
- B.S. Natural Resources Management, University of Tennessee at Martin, 1981
- M.S. Fisheries and Wildlife, Michigan State University, 1985
- M.S. Communication, Michigan State University, 1985

Forest Service: 4 years
- Public Affairs Specialist, Forest Plan Revision Team (2 years)
- Social Scientist, Ketchikan Area (1 year)
- Subsistence Specialist, Ketchikan Area (1 year)

Other Relevant Employment:
- Fisheries and Wildlife Internship Coordinator, Michigan State University, 1981-1985
- Teaching Assistant, University of Tennessee at Martin, 1980-1981
- Park Technician, US Army Corps of Engineers, 1979-1980
- Park Naturalist, Tennessee State Parks, 1978

Mark L. Orme — **Wildlife Biologist**

Contributions made:
- Coordinated with other Federal and State agencies which have wildlife management responsibilities in southeast Alaska to compile the wildlife habitat and population information for the Revision.
- Coordinated with natural resource scientists to develop Research Natural Area proposals for the Revision
- Worked with the Forestry Sciences Lab to develop Experimental Forest proposals for the Revision; worked with Forest Service staff, the Alaska Department of Fish and Game and the University of Alaska in the gathering and analysis of subsistence use in southeast Alaska.
- Worked with Forest Service staff, other Federal and State agencies to compile the habitat and population information for threatened and endangered and sensitive species.

Education:
- BS Forestry, University of Idaho - 1971
- MS Wildlife Management, University of Idaho - 1975

Forest Service: 12 1/2 years
- Wildlife Biologist, Region 10 - 2 years
- Wildlife Biologist, Targhee National Forest - 6 years
- Wildlife Biologist, Idaho Panhandle National Forest - 3 years
- Forestry Technician, Clearwater National Forest - 1 year
- Hydrologic Technician, Clearwater National Forest - 6 months

Other Relevant Employment:
- Research Associate, Univ. of Idaho - 2 years
- Biological Technician, Idaho Department of Fish and Game - 2 years

Rick Perkins

GIS Technician, Computer Assistant, JRD

Contributions made:
ARC/INFO User, Data-Editing, AML-Programming

Bruce Rene

Natural Resource Planner, Documents Coordinator

Contributions made:
Provide guidance on and facilitate: 1) the documentation of the National Forest Management Act planning process, and 2) the analysis and documentation required by the National Environmental Policy Act.

Education:
BA, Humanities, 1967
MA, English, 1970
MBA, Business Administration, 1976

Forest Service: 12 years
Documents Coordinator, here, a few months
Assistant Forest Planner & Environmental Coordinator, Stanislaus N.F., 11 years

Other Relevant Employment.
Employment outside the Forest Service. Nothing particularly relevant.

Jim Schramek

GIS Coordinator (Stikine Area)

Education:
B.S. Forestry, University of Minnesota, 1971.
M.S. Forest Hydrology, University of Minnesota, 1977

Forest Service: 12 years
GIS Coordinator, Stikine Area (2 years)
Planner, Stikine Area (5 years)
Hydrologist, Stikine Area (5 years)

John C. Sherrod

Planning Staff Officer, Chatham Area Management Team Representative

Contributions made:
Review and oversight.

Education:
B.S. Forestry, University of Georgia, 1960.
M.S. Forest Resources, University of Idaho, 1980.

Forest Service: 27 years
Planning Staff Officer on the Helena, Chugach, and Tongass National Forests 11 years)
Planning Team Leader on the Custer, Gallatin, and Willamette National Forests (6 years)
Ranger District assignments on four Districts on the Colville and Custer National Forests (10 years)

Tammy Skeens

Natural Resource Planner- Stikine Area SO

Contributions made:

GIS support - Assignment as Asst. GIS Coordinator/Database Manager working w/Revision to build and edit the database. Worked with a variety of resource layers.

Education:

B.S. Natural Resources Management, Colorado State University, 12/83

Forest Service: 8.5 years

Natural Resource Planner- ID Team Leader, 2 months
Assistant GIS Coordinator- Stikine Area, 2 years

Other Relevant Employment.

One season YCC Bureau of Reclamation
One season YCC Youth Leader Bureau of Reclamation

James M. Thomas

Supervisory Computer Programmer Analyst

Contributions made:

Prepared Roadless Area Reports for the Chatham Area
Provided Computer and Telecommunications support

Education:

B.A. Environmental Biology, University of Colorado, 1974
Graduate Studies in Geology, Western State College, 1979
Graduate Studies in Forestry, Resource Planning, Recreation Management, Colorado State University, 1981

Forest Service Employment (11 years):

Supervisory Computer Programer Analyst
- Tongass National Forest, Chatham Area (3 years)
- Arapaho and Roosevelt National Forest (2 years)

Operations Research Analyst, Shawnee National Forest (3 years)
Natural Resource Planner, White River National Forest (1 year)
Forest Technician, (Part Time for 5 years)
- Arapaho and Roosevelt National Forest
- San Juan National Forest
- White River National Forest

Lance H. Tyler

Recreation Planner

Education:

B.A. International Relations (Asian Studies) 1967
M.S. Recreation Resources, Colorado State University, 1977

Forest Service: 12 years

Outdoor Recreation Planner, Arapaho and Roosevelt National Forests 12 years

Other Relevant Employment:

Supervised university contract for development of State Comprehensive Outdoor Recreation Plan (SCORP) for Colorado 1976
U.S. Department of State 1967-1975, Washington D.C., Taiwan, Hong Kong

Eugene (Gene) Wheeler

Forester. **Represent State & Private Forestry on the IDT for Revision of the Tongass Land Management Plan**

Contributions made:
Provided the Forest Wide S&G's and the Prescription S&G's for Fire Management and for Insect & Disease Management.

Education:
B.S. Forest Management, Washington State University, 1957

Forest Service: 33 years
Gr. Ldr. for Forest Management, Planning, & Utilization, Region 10 (11 years)
River Basin Planner, Region 6 (10 years)
Asst. Ranger, Chesnimnus RD, Wallowa Whitman NF (5 years)
Asst. Recreation Staff, Wallowa-Whitman NF (2 years)
Asst. Ranger, Judith Basin RD, Lewis & Clark NF (2 years)
TMA, Libby RD, Kootenai NF (3 years)

Bill Wilson

Timber Planner

Education:
B.S. Forestry, McNeese State University, 1968

Forest Service: 22 Years
Revision IDT Member, Tongass National Forest, (1987-Present)
Regional Office Timber Planner, Alaska Region, (7 years)
District and Supervisors Office Timber Assistant, Lincoln N.F. (3 years)
District Timber Assistant, Kiabab N.F., (1 year)
Supervisors Office Timber Assistant, Prescott N.F. (4 years)
Inventory Forester, Southern Forest Experiment Station, (3 years)
Forestry Aid, Mt. Hood N.F., (1 year)

Elsan Zimmerly

Writer/Editor

Contributions made:
Writer/Editor, Socioeconomic Overview

Education:
B.S. Forest Recreation, Colorado State University, 1984.
Country School of Photography, Vermont

Forest Service: 4 years
Naturalist (2 years)
Photographic Coordinator; Begich, Boggs Visitor Center
Portage, Alaska
Writer/Photographer, 2 years

Other Employment:
Instructor of Photography, Experiential Learning Program, Colorado State University (6 years)

GLOSSARY

GLOSSARY OF TERMS

A

Adfluvial Fish	Species or populations of fish that do not go to sea, but live in lakes, and enter streams to spawn.
Adjudicate	To settle in the exercise of judicial authority. To determine finally. (Black, 1979, Black's Law Dictionary).
Airshed	Geographical areas, which because of topography, meteorology, and climatic conditions, share the same air mass. Management of air quality is done by airshed.
Allowable Sale Quantity (ASQ)	The maximum harvest volume that may be scheduled during the plan period to meet meet long-term production while providing for other resource objectives.
Alluvial	A soil developing in rock fragments or soil material deposited by running water and exhitbiting essentially no horizon development or modification of the recently deposited materials.
Alluvial Fan	A body of alluvium material, with or without debris flow deposits whose surface forms a segment of a fan-shaped cone that radiates downslope from the point where the stream emerges from a narrow valley into a less-sloping surface.
Alpine	Alpine refers to parts of mountains above tree growth or to organisms living there.
Ambient Air Quality Standards	The prescribed level of pollutants in the outside air that cannot by exceeded legally during a specified time in a specified geographical area.
Amenity	Resource use, object, feature, quality, or experience that gives pleasure or is pleasing to the mind or senses. Amenity value typically describes those resource properties for which market values (or proxy values) are not or cannot be established.
ANCSA	The Alaska Native Claims Settlement Act of December 18, 1971. Public Law 92-203, 92nd Congress, 85 Stat. 688-716.
ANILCA	The Alaska National Interest Lands Conservation Act of December 2, 1980. Public Law 96-487, 96th Congress, 94 Stat. 2371-2551.
Anadromous Fish	Fish which mature and spend much of their adult life in the ocean, returning to inland waters to spawn. Salmon and steelhead are examples.
Appropriation of Land	The act of selecting, devoting, or setting apart land for a particular use or purpose, as where land is appropriated for public buildings and military reservations or other public uses (Black, 1979).

Aquatic Ecosystem	A stream channel, lake or estuary bed, the water itself, and the biotic communities that occur therein.
Area of Potential Effects	The geographic area or areas within which an undertaking may cause changes in the character or use of historic properties, if any such properties exist.
Atmospheric Dispersion	The lofting and distribution of particulate matter from wood smoke into the atmosphere over time.

B

Background	The distant part of a landscape. The seen, or viewed, area located from three or five miles to infinity from the viewer.
Bedload	Sand, silt, and gravel, or soil and rock debris carried by a stream on or immediately above its bed. The particles of this material have a density or grain size which prevents movement far above or for a long distance out of contact with the streambed under natural flow conditions.
Best Management Practices (BMP's)	The set of practices which, when applied during implementation of a project, ensures that water-related beneficial uses are protected and that State Water Quality standards are met.
Process	Custom fit practices, measures, or methods developed for projects through inventory and analysis, and interdisciplinary involvement.
Standard	Established or "fixed" methods, measures, or methods that are applied to projects.
Biomass	The total quantity, at a given time, of living organisms of one or more species per unit area or all of the species in a community.
Bole	Trunk of the tree. A tree stem once it has grown to substantial thickness - roughly to that capable of yielding poles, sawlogs, or veneer logs.
Boulders	Rounded or angular rocks greater than 12 inches in size.

C

Channel	(Watercourse) - An open conduit, either naturally or artifically created, which periodically or continuously contains moving water, or which forms a connecting link between two bodies of water. River, creek, run branch, anabranch, and tributary are some of the terms used to describe natural channels. Natural channels may be single or braided. Canal and floodway are some of the terms used to describe artificial channels.

Channel Braiding	Development of channels by the stream or river that interweave as a result of repeated double branching and convergence of flow around interchannel bars, resembling in plan the strands of a complex braid.
Channel Migration	Movement of the stream or river channel within a floodplain area usually over an extended period of time.
Channel Type	A means of distinguishing parts of a stream system into segments which have fairly consistent physical and biological characteristics. For descriptions, see "Channel Type Field Guide," Publication R10-MB-6.
Claim	To demand as one's own or as one's right; to assert; to urge;, to insist (Black 1979).
Clearance (cultural resources)	Certification by the Forest Supervisor documenting that the requirements of 36 CFR 800 have been fully met for each undertaking.
Clearcut	Harvesting method in which all trees are cleared in one cut. It prepares the area for a new, even-aged stand. The area harvested may be a patch, stand, or strip large enough to be mapped or recorded as a separate age class in planning.
Coarse Gravel	In soils coarse gravel is rounded rocks generally consider 3/4 of an inch to 3 inches in size.
Cobbles	Rounded rocks between 3 and 12 inches in size.
Colluvial	A soil developing in a deposit of rock fragments and soil material accumulated on slopes or at the base of steep slopes as a result of gravitational action.
Commodities	Resources with commercial value; all resource products which are articles of commerce, such as timber and minerals.
Common Variety Minerals	Deposits of sand, stone, gravel, and others of widespread occurrence not having distinct of special value. These deposits are used generally for construction and decorative purposes and are disposed of under the Materials Act of 1947.
Confluence	The point where two streams meet.
Convey	To pass or transmit the title to property from one to another. (Black, 1979, Black's Law Dictionary)
Conveyance	An instrument by which some estate or interest in lands is transferred from one person to another. (Black, 1979, Black's Law Dictionary)
Confined Streams	(Stream channel). Streams that are confined within their channel banks; controlled by stream incision, geomorphic landform characteristics, and local geological conditions.
Created Opening	Openings in the Forest canopy created by silvicultural practices including shelterwood regeneration cutting, clearcutting, seed tree cutting, or group selection cutting.

Critical Habitat	Specific areas within the geographical area occupied by threatened or endangered species, on which are found those physical and biological features that are essential to conservation of the species and which may require special management considerations or protection.
Crown	The tree canopy. The upper part of a tree or woody plant that carries the main branch system and foliage.
Culmination Mean Annual Increment (CMAI)	The point at which the volume increment for a tree or stand of trees has achieved it's highest mean value. Mean annual increment is based on expected growth according to the management intensities and utilization standards assumed in the Forest Plan.
Cultural Resources	The physical remains of districts, sites, structures, buildings, networks, events, or objects used by humans in the past. They may be historic, prehistoric, architectural, or archival in nature. Cultural resources are non-renewable aspects of our national heritage.

D

Debris flows	A category of mass movement that is of unconsolidated material exhibiting a continuity of movement and a plastic or semi-fluid behavior resembling that of a viscous fluid.
Debris slides	The rapid downslope movement of a mixture of soil, rock, and forest litter with or without a relatively high water content. Also known as debris avalanches.
Debris torrents	Landslides that occur as a result of debris; avalanche materials which either dam a channel temporarily or accumulate behind temporary obstructions such as logs and forest debris. Debris torrents are usually confined within the stream channel until it reaches the valley floor where the debris spreads out, inundating vegetation and forming a broad surface deposit.
Decks	Cut timber, sawlogs, or cull logs that have been removed from logging units and stacked.
Detritis	The heavier mineral debris moved by natural watercourses, usually in bedload form.
Developed Recreation	That type of recreation that occurs where modifications (improvements) enhance recreation opportunities and accommodate intensive recreation activities in a defined area.
Diameter at Breast Height (DBH)	The diameter of a standing tree at a point four feet, six inches from ground level.
Discharge Velocity	The speed of water outflow over a given period of the time from a stream or river.

Dispersed Recreation	That type of recreation use that requires few, if any, improvements and may occur over a wide area. This type of recreation involves activities related to roads, trails and undeveloped waterways and beaches. The activities do not necessarily take place on or adjacent to a road, trail, or waterway, only in conjunction with it. Activities are often day-use oriented and include hunting, fishing, boating, off-road vehicle use, hiking, and many others.
Dissected Landforms	A physical, recognizable form or feature of the earth's surface such as a mountain, hill, or valley, having a characteristic shape, that in part is the result of several shallow or deeply incised drainage channels.
Dissolved oxygen	The amount of free (not chemically combined) oxygen in water.
Distance Zone	Areas of landscapes denoted by specified distances from the observer (foreground, middleground, or background). Used as a frame of reference in which to discuss landscape characteristics of management activities.
Diversity	The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.
Duff layer	The general term for vegetation material covering the mineral soils in forests including the fresh litter and well-decomposed organic material and humus.

E

Ecosystem	A complete, interacting system of organisms considered together with their environment (for example; a marsh, a watershed, or a lake).
Ecotone	A transition or junction zone between two or more naturally occurring diverse plant communities (ecosystems).
Ecotype	A species of plant or animal that display different genetic or physiological adaptations. For example, the brown bear in southeast Alaska is the same species as the grizzly bear in interior Alaska but the brown bear is smaller than the grizzly.
Effect (cultural resources)	The potential of an undertaking to alter the characteristics that may qualify a property for inclusion in the National Register of Historic Places.
Emergent	Plants that begin standing at least until the beginning of the next growing season (cattails).
Encumbrance	Any right to, or interest in, land which may subsist in another to diminution of its value, but consistent with the passing of the fee. A claim, lien, charge, or liability attached to and binding real property. (Black, 1979, Black's Law Dictionary)
Entitlement	Right to benefits, income or property which may not be abridged without due process. (Black, 1979, Black's Law Dictionary)

Environmental Impact Statement (EIS)	A document prepared by a federal agency in which anticipated environmental effects of a planned course of action or development are evaluated. A federal statute (Section 102 of the National Environmental Policy Act of 1969) requires that such statements be prepared. It is prepared first in draft or review form, and then in a final form. An impact statement includes the following points: (1) the environmental impact of the proposed action, (2) any adverse impacts which cannot be avoided by the action, (3) the alternative courses of actions, (4) the relationships between local short-term use of man's environment and the maintenance and enhancement of long-term productivity, and (5) a description of the irreversible and irretrievable commitment of resources which would occur if the action were accomplished.
Ephemeral channels	A stream that flows only in direct response to precipitation, and thus discontinues its flow during dry seasons. Its channel is above the level of the water table.
Equipment fires	Those wildfires that have their origin from the use of equipment in forest operations such as logging, yarding, chainsaw use, land clearing, road building, etc.
Erosion	The wearing away of the land surface by running water, wind, ice, or other geological agents, including such processes as gravitational creep, detachment and movement of soil or rock by water, wind, ice, or gravity.
Estuarine	Deepwater tidal habitats and adjacent tidal wetlands that are usually semi-enclosed by land, but have open, partly obstructed or sporadic access to the open ocean, and in which ocean water is at least occasionally diluted by freshwater runoff from the land.
Evapotranspiration	The sum total of water lost from the land by evaporation and plant transpiration. Transpiration is loss of water in vapor form from a plant.
Even-aged Management	The application of a combination of actions that result in the creation of stands in which trees of essentially the same age grow together.
Executive Order	An order or regulation issued by the President or some administrative authority under his direction for the purpose of interpreting, implementing, or giving administrative effect to a provision of the Constitution or of some law or treaty.
Existing Data Search	A systematic check and evaluation of available records, documents, and informant sources to gather information pertinent to cultural resources within a given area.
Existing Visual Condition (EVC)	EVC ratings are established to give the land manager an indication of the current level of visual quality and visual evidence of management activities. EVC classes are as follows: Type 1: Appears to be untouched by human activities, except for trails needed for access, only ecological changes have occurred. Type 2: Changes in the landscape are not noticed unless pointed out. Type 3: Changes in the landscape are noticed as minor disturbances, but the natural appearance of the landscape remains dominant. Type 4: Changes in the landscape are easily noticed and perceived as disturbances, but resemble natural patterns.

	Type 5: Changes stand out as a dominant impression on the landscape, yet are shaped to resemble natural patterns from 3-5 miles or more distant. Type 6: Changes are in glaring contrast to the landscape's natural appearance; excessive visual alteration has occurred.

F

Facility	A single or contiguous group of improvements that exists to shelter or to support Forest Service programs.
Fire Suppression	All the work of extinguishing or confining a fire beginning with its discovery.
Fiscal Year	October 1 to September 30. The year assigned is that of the calender year which begins on January 1.
Flash flooding	A very rapid responding, relatively high streamflow overtopping the natural or artificial banks in any reach of a stream.
Floodplain	The nearly level alluvial plain that borders a stream and is subject to inundation under flood-stage conditions unless protected artifically. It is usually a constructional landform built of sediment deposited during overflow and lateral migration of the stream or river.
Footslope	The geomorphic component that forms the inner, gently inclined surface at the base of a hill or mountain slope. The surface profile is dominantly concave, and in terms of gradation process, it is the transition zone between upslope erosional sites and downslope depositional sites.
Forest Plan	Source of management direction for an individual Forest specifying activity and output levels for a period of 10-15 years. Management direction in the plan is based on the issues identified at the time of the plan's development.
Forested wetland	A wetland whose vegetation is characterized by an overstory of trees that are 20 feet or taller.
Forest-wide Direction and Standards/Guidelines	Establish the environmental quality, natural renewable and depletable resource requirements, conservation potential, and mitigation measures that apply to several management area prescrptions.
Fuel	The organic materials that will support the start and spread of a fire. Duff, litter, grass, weeds, forbs, brush, trees, and dead woody materials.
Fuel Loading	The volume of the available or burnable fuels in a specified area.

G

Glacial Refugia	Glacial refugia are the areas of Southeast Alaska that were not covered by glaciers during the last ice age.

Glacial Rivers and Streams	Rivers and streams that receive their main flow characteristics from the presence and activities of ice and glaciers and melt water from them.
Glide or Placid Streams	Grouping of channel types (L1 and L2) that have fairly consistent physical characteristics occurring on lowland landforms and are mostly associated with bogs, marshes, or lakes.
Groundwater	Water within the earth that supplies wells and springs. Specifically, water in the zone of saturation where all openings in soils and rocks are filled - the upper surface level froms the water table.
Group Selection	A cutting method to develop and maintain uneven-aged stands by the removal of small groups of trees to meet a predetermined goal of size distribution and species composition in remaining stands.

H

Heavy Metal	A particularly offensive form of rock music.
Historic Property	Any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register. The term includes artifacts, records, and remains that are related to and located within such properties.
Hydrologic cycle	The complete cycle through which water passes, commencing as atmospheric water vapor, passing into liquid and solid form as precipitation, thence along or into the ground surface, and finally again returning to the form of atmospheric water vapor by means of evaporation and transpiration. Also called Water Cycle.
Hydrophyte	Any macrophyte that grows in water or on a substrate that is at least periodically deficient in oxygen as a result of excessive water content; plants typically found in wet habitats.

I

Ignition	The initiation of combustion.
Implementation (cultural resources)	That point in an undertaking when the proponent has full and complete authorization to proceed with the undertaking.
Intensity	A measure (in BTU's per foot per second) of the energy released per unit of time in an area of actively burning fire. The amount of heat released per foot of fire front per second.
Interceptions	The process by which precipitation is caught and held by foliage, twigs, and branches of trees, shrubs, and other vegetation, and lost by evaporation, never reaching the surface of the ground. Interception equals the precipitation on the vegetation minus stemflow and throughfall.

Interest (in land)	A general term to denote a right, claim, title, or legal share in real estate. (Black, 1979, Black's Law Dictionary)
Invertebrate population	That population of creatures without a backbone. Context would depict whether land invertebrates, shore invertebrates, or water invertebrates. Most forest connotations deal with the insect populations.
Irretrievable	Applies to losses of production, harvest, or use of renewable natural resources.
Irreversible	Applies primarily to the use of nonrenewable resources such as minerals or cultural resources, or to those factors which are renewable only over long time spans, such as soil productivity. Irreversible also includes loss of future options.
Integrated Pest Management (IPM)	A process for selecting strategies to regulate forest pests in which all aspects of a pest-host system are studied and weighed.
Interdisciplinary Team (IDT)	A group of individuals with different training assembled to solve a problem or perform a task. The team is assembled out of recognition that no one scientific discipline is sufficiently broad to adequately solve the problem. Through interaction, participants bring different points of view and a broader range of expertise to bear on the problem.
Invertebrates	Animals lacking spinal columns.

L

Lacustrine	Wetlands - includes permanently flooded lakes and reservoirs, intermittent lakes, and tidal lakes with ocean-derived salinities of below 0.5 percent. Typically, there are extensive areas of deep water and there is considerable wave action.
Land Exchange	The conveyance of non-Federal Land or interests to the United States in exchange for National Forest System land or interests in land.
Land Use Designation (LUD)	General management prescriptions applied to a Value Comparison Unit or group of Value Comparison Units. These land use designations are as follows.
LUD 1	Forest Service recommended wilderness areas, most of which became Wilderness through the Alaska National Interest Lands Conservation Act. In general, these undeveloped areas are managed for solitude and primitive types of recreation, and contain unaltered habitats for plants and animal species. These areas are managed as directed in the 1964 Wilderness Act, as amended.
LUD 2	Lands under this designation are managed in a roadless state to retain their wildland character. Primitive recreational facilities can be built and habitat improvements for fish and wildlife are permitted. Timber harvest on these lands is limited to salvage operations to protect other resources.
LUD 3	These lands are managed for a variety of uses. The emphasis is on managing for both amenity and commodity oriented uses in a compatible manner to provide the greatest combination of benefits. These areas usually have high amenity values in conjunction with high commodity values. Allowances in calculated potential timber yield have been made to meet multiple-use coordination objectives.

LUD 4	These lands are managed to provide opportunities for intensive development of resources. Emphasis is primarily on commodity, or market resources and their use. Amenity values are also provided for. When conflicts over competing resource uses arise, conflicts would most often be resolved in favor of commodity values. Allowances in calculated potential timber yield have been made to provide for protection of physical and biological productivity.
Land Utilization Project	A unit designated by the Secretary of Agriculture for conservation and utilization under Title III of the Bankhead-Jones Farm Tenant Act. (USDA Forest Service, undated, Land Areas of the National Forest System)
Landform	Any physical, recognizable form or feature of the earth's surface, having a characteristic shape, and produced by natural causes. Major forms included are plains, plateaus, and mountains; minor forms are hills, valleys, slopes, eskers, and dunes.
Landslides	Landslides are a mass-wasting process involving moderately rapid to rapid downslope transport of soil and rock materials, by means of gravitational stresses. This mass of rock and soil may or may not be water-saturated.
Large Woody Debris	Any large piece or relatively stable woody material in a stream or river, having a diameter of four inches or greater and a length greater than three feet, that intrudes into a stream channel. Synonyms are LWD, wood debris, log.
Leasable Minerals	Those minerals which are disposed of under authority of the various mineral leasing acts. Minerals include coal, oil, gas, phosphate, sodium, potassium, oil shale, and geothermal steam.
Leave Strips	The result of timber harvest activities where blocks of timber are left after harvest has occurred.
Lifeform	Any living entity, animal, or plant.
Locatable Minerals	Those minerals which are disposed of under the general mining laws. Included are minerals such as gold, silver, lead, zinc and copper which are not classed as leasable or salable.
Log Transfer Facility (LTF)	Formerly referred to as Terminal Transfer Facilities, Log Transfer Facilities include the industrial site and facilities (structure) used for moving logs and timber products from land-based transportation forms to water-based transportation forms.
Lows	Atmospheric disturbances that can properly be considered as storms, for they bring changeable, unsettled weather that normally includes widespread, abundant, and often, intensive precipitation.

M

Management Area	As defined in the first Tongass Land Management Plan: Combinations of Value Comparison Units having common management direction. As defined in the Forest Plan Revision: An aggregation of areas which have common management direction and may be noncontiguous in the Forest.
Management Indicator Species (MIS)	Species selected in a planning process that are used to monitor the effects of planned management activities on viable populations of wildlife and fish, including those that are socially or economically important.
Management Prescription	Management practices and intensity selected and scheduled for application on a Management Area to attain multiple-use and other goals and objectives.
Macrophytes	Any plant species that can be readily observed without the aid of optical magnification.
Memorandum of Understanding	A legal agreement between the Forest Service and non-Federal agencies resulting from consultation between agencies that states specific measures the agencies will follow to accomplish a large or complex project. A memorandum of understanding is not a fund obligating document.
Maritime Climate	The aggregate of day to day weather conditions that include widespread abundant precipitation and temperatures that do not vary a great deal from winter to summer.
Marine Systems	Consists of the open ocean overlying the continental shelf and its associated high-energy coastline. Is open ocean and the water regimes are determined primarily by the ebb and flow of the ocean tides. These also include shallow coastal indentations of bays without appreciable freshwater inflow.
Mass Movement	Dislodgement and downslope transport of earth material as a unit under direct gravitational stress. The process includes slow displacements such as creep and solifluction, rapid movements such as landslides, rock slides and falls, earthflows, debris flows, and avalanches.
Microclimate	The climatic condition of a small area resulting from a modification of the general climatic conditions by local differences in elevation and exposure.
Middleground	The visible terrain beyond the foreground where individual trees are still visible but do not stand out distinctly from the landscape. The area is located from 1/4 to 5 miles from the viewer.
Mineral Entry	The filing of a mining claim on Federal land to obtain the right to mine any locatable minerals it may contain. Also the filing for a mill site on Federal land for the purpose of processing off-site locatable minerals.
Mineral Exploration	The search for valuable minerals.
Mineral Production	The extraction of mineral deposits.

Mineral Soils	Soils consisting predominantly of, and having its properties determined by, mineral matter. These soils usually contain less than 20 percent organic matter, but can contain an organic surface layer up to within 20 inches of the surface.
Mineral Withdrawal	A formal designation by the Secretary of Interior which precludes entry or disposal of mineral commodities under the mining and/or mineral leasing laws.
Mining Claims	A geographic area of the public lands held under the general mining laws in which the right of exclusive possession is vested in the locator of a valuable mineral deposit.
Mitigate	To lessen the severity.
Mixed Conifer	In Southeast Alaska, mixed conifer stands usually consist of the following species: western hemlock, mountain hemlock, Alaska yellow-cedar, redcedar, and Sitka spruce. Shorepine may occassionally be present depending on individual sites. Redcedar is not usually in mixed conifer stands on the Chatham or Stikine areas.
Moderately well-drained soils	Water in these soils is removed from them somewhat slowly, so that the profile is wet for a small, but signifcant, part of the time. Soils within this drainage class do not have mottles that have chroma of 2 or less within 20 inches.
Moisture regime	The variation of moisture content in a specified portion of soil during the year.
Monitoring and Evaluation	The periodic evaluation on a sample basis of Forest Plan management practices practices to determine how well objectives have been met and how closely management standards have been applied.
Mop-up	Following suppression activities to stop the spread of the fire, the business of extinguishing the fire is called mop-up.
Muskeg	A muskeg in Southeast Alaska is a type of bog that has developed over thousands of years in depressions, or flat areas on gentle to steep slopes. These bogs have poorly drained, acidic, organic soils materials that support (depending on the type of bog hydrarch succession) vegetation that can be either sphagnum moss or herbaceous plants or sedges, rushes, and forbs or may be a combination of sphagnum moss and herbaceous plants. These vegetation types may have a lesser abundance of shrubs and stunted trees.

N

National Forest	A unit formally established and permanently set aside and reserved for National Forest purposes. (USDA Forest Service, undated, Land Areas of the National Forest System).
National Forest System	A Nationally significant system of Federally owned units of Forest, Range, and related land consisting of National Forests, Purchase Units, National Grasslands, Land Utilization Project Areas, Experimental Forest Areas, Experimental Range Areas, designated Experimental Areas, other land areas, water areas, and interests in lands that are administered by the Forest Service or designated for administration through the Forest Service. (USDA Forest Service, undated, Land Areas of the National Forest System)

National Grassland	A unit designated "National Grasslands" by the Secretary of Agriculture and permanently held by the Department of Agriculture under Title III of the Bankhead-Jones Farm Tenant Act. (USDA Forest Service, undated, Land Areas of the National Forest System)
No Adverse Effect (cultural resources)	When the "Effect" on a cultural resource would not be considered harmful to those characteristics that qualify the property for inclusion in the National Register.

O

Order Three Inventory	A level of soil surveys made for extensive land uses that do not require precise knowledge of small areas or detailed soils information. Such survey areas are usually dominated by a single land use and have few subordinate uses. This information can be used in planning for range, forest, recreational areas, and similarly extensive land uses and in community planning.
Order Four Inventory	A soil survey level made for extensive land uses that require general information for broad statements concerning land-use potential and general land management. This information can be used in locating, comparing, and selecting suitable areas for major kinds of land use, in regional land-use planning, and in selecting areas for more intensive study and investigation.
Organic Soils	A soils which contains a high percentage (greater than 15 percent) of organic matter throughout the soil depth.
Overflow	High runoff which overflows natural stream and river banks. Also known as flooding.
Overselection	Unconveyed lands selected in excess of entitlement. Overselections by the State of Alaska are authorized in Section 906 (f), ANILCA. They are authorized for Native Corporations organized under ANCSA in Federal Regulations (43 CFR 2650).

P

Palustrine	A wetland system that includes all nontidal wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and all such wetlands which occur in tidal areas where salinity, due to ocean-derived salts, is less than 0.5 percent.
Parent Material	The unconsolidated, and more or less chemically weathered, mineral or organic matter from which the solum of soils is developed by pedogenetic processes.
Parts per Million	Is a measurement of concentration indicating the quantity of a substance per unit volume of a solution.
Peak flow	The highest discharge recorded over a specified period of time at a given stream location. Often though of in terms of spring snowmelt, summer, fall or winter rainy season flows. Also called maximum flow.
Prescribed fire	A wildland fire burning under preplanned, specific conditions to accomplish specific land and resource objectives. It may result from either a planned or unplanned ignition.

pH	The degree of acidity or alkalinity of a soils at a specified soil-water ratio, and expressed in terms of the pH scale.
Plant communities	Aggregations of living plants having mutual relationships among themselves and to their environment. More than one individual plant community.
Poorly drained soils	Water in these soils is removed so slowly that the soil remains wet for a large part of the time. The water table is commonly at or near the surface during a considerable part of the year.
Population viability	Ability of a population to sustain itself.
Prescribed Fire	A fire burning under specified conditions which will accomplish planned objectives in strict compliance with an approved plan and the conditions under which the burning takes place and the expected results are specific, predictable, and measurable.
Preservation	A technique of conservation which maintains the resource in or on the ground in perpetuity.
Primary Succession	Vegetation development is initiated on newly formed soils or upon surfaces exposed for the first time (as by landslides) which have as a consequence never borne vegetation before. Any succession beginning on a bare area not previously occupied by plants or animals.
Process Group	A combination of similar channel types based on major differences in landform, gradient and channel shapes.
Proponent	An agency, institution, individual, etc. applying to perform an activity on National Forest System lands under authority of a mining plan of operation, contract, license, special use permit, or other agreement.
Purchase Unit	A unit designated by the Secretary of Agriculture or previously approved by the National Forest Reservation Commission for purposes of Weeks Law acquisition. (USDA Forest Service, undated, Land Areas of the National Forest System)

R

Recreation Opportunity Spectrum (ROS)	A system for planning and managing recreation resources that categorizes recreation opportunities into seven classes.
Primitive	A natural environment of fairly large size. Interaction between users is very low, and evidence of other users is minimal. The area is managed to be essentially free from evidence of human-induced restrictions and controls.
Semi-Primitive Non-Motorized	A natural or natural-appearing environment of moderate to large size. Interaction between users is low, but there is often evidence of other users. The area is managed to minimize onsite controls and restrictions. Local roads used for other resource management activities may be present.

Semi-Primitive Motorized	A natural or natural-appearing environment of moderate to large size. Concentration of users is low, but there is often evidence of other users. The area is managed to minimize onsite controls and restrictions. Use of local roads for recreational purposes is not allowed.
Roaded Natural	A natural-appearing environment with moderate evidence of the sights and sounds of man. Such evidence usually harmonizes with the natural environment. Interaction between users may be moderate to high with evidence of other users prevalent. Motorized use is allowed.
Roaded Modified	A natural environment that has been substantially modified particularly by vegetative manipulation. There is strong evidence of roads and/or highways. Frequency of contact is low to moderate.
Rural	A natural environment that has been substantially modified by development of structures, vegetative manipulation. Structures are readily apparent and may range from scattered to small dominant clusters. Sights and sounds of humans are readily evident, and the interaction between users is often moderate to high.
Recreation Places	Identified geographical areas having one or more physical characteristics that are particularly attractive to people engaging in recreation activities. They may be beaches, streamside or roadside areas, trail corridors, hunting areas of the immediate area surrounding a lake, cabin site, or campground.
Reducing Soil Condition	An environment in the soil conducive to the removal of oxygen and chemical reduction of ions caused by saturated soil conditions.
Relinquish	To abandon, to give up, to surrender, to renounce some right or thing. (Black, 1979, Black's Law Dictionary)
Research and Experiment Area	A unit reserved and dedicated by the Secretary of Agriculture for forest or range research and experimentation. (USDA Forest Service, undated, Land Areas of the National Forest System)
Research Design	A statement of work to be done toward a particular goal. The research design details what will be done, how it will be done, what is required to do it, and why it is important or useful to do the work .
Research Natural Area (RNA)	An area in as near a natural condition as possible, which exemplifies typical or unique vegetation and associated biotic, soil, geologic, and aquatic features. The area is set aside to preserve a representative sample of an ecological community primarily for scientific and educational purposes; commercial and most public uses are not allowed.
Resident Fish	Fish that are not migratory and complete their entire life cycle in fresh water.
Riffles	Shallow rapids in an open stream, where the water surface is broken into by waves by obstructions wholly or partially submerged.
Riparian Area	Geographically delineable areas with district resource values and characteristics that are comprised of the aquatic and riparian ecosystems.

Riparian Area Management	Areas with distinctive resources values and characteristics that are comprised of of aquatic and riparian ecosystems or adjacent upland areas that have direct relationships with the aquatic ecosystem in the absence of a riparian ecosystem. This area as a minimum is one hundred horizontal feet distance from all sides of perennial streams, lakes, and other bodies of fresh water, or to the recognizable area dominated by associated riparian ecosystem (vegetation and soil), whichever is greater.
Riparian Ecosystem	A transition between the aquatic ecosystem and the adjacent upland terrestrial ecosystem. It is identified by soil characteristics and by distinctive vegetative communities that require free or unbounded water.
Riverine System	A category level in wetland classification which includes all wetlands and deepwater habitats contained within a channel, with two exceptions: (1) wetlands dominated by trees, shrubs, persistent emergents, emergent mosses or lichens, and (2) habitats with water containing ocean-derived salts in excess of 0.5 percent.
Rotation	The planned number of years between the formation or the regeneration of a crop or stand of trees and its final cutting at a specified stage of maturity.
Rotation Age	The age of a stand when harvested at the end of a rotation.
Rubble	All accumulations of loose angular rock fragments, commonly overlying outcropping rock.

S

Saturated Soils	Soil condition where all the spaces between soil particles are filled with water.
Scrub-Shrub Wetland	Includes wetlands dominated by woody vegetation less than 20 feet tall. The species include true shrubs, young trees, and trees or shrubs that are small or stunted because of environmental conditions. In Southeast Alaska this includes forested lands where trees are stunted because of poor soil drainage.
Second-Growth	Forest growth that has come up naturally or has been planted after some drastic interference (for example, clearcut harvest, serious fire, or insect attack) with the previous forest growth.
Secondary Succession	The process of vegetation re-establishment after a normal succession is disrupted by fire, cultivation, lumbering, windthrow, or any similar disturbance.
Sediment	Solid material, both mineral and organic, that is in suspension, being transported, or has been moved from its site of origin by air, water, gravity, or ice.
Sensitive Species	Those plant or animal species which are susceptible or vulnerable to activity impacts or habitat alterations. Species that have appeared in the Federal Register as proposed for classification and are under consideration for official listing as endangered or threatened species, that are on an official state list, or that are recognized by the regional Forester as needing special management to prevent their being placed on Federal or state lists.
Sensitive Travel Route	A road system or marine water way which receives a moderate to high degree of use by the public, both Alaskan residents and tourists.

Sensitivity Level	A measure of the people's concern for the scenic quality of the National Forest applied to travel routes, use areas, and water bodies.
Sensitivity Zone	A body of land which has been classified on the basis of cultural and environmental data, as having a high, medium, or low likelihood/probability for containing cultural resources.
Severity	The amount of heat over a given area that is measured over the period of residence time of the flaming front through the smolder period of a fire. Severity is important to monitor for duff layer consumption, tree root damage, and possible soil damage.
Shelterwood Cutting	The removal of a stand of trees through a series of cuttings designed to establish a new crop with seed and protection provided by a portion of the stand.
Silviculture Method	A management process whereby forests are tended, harvested, and replaced, resulting in a forest of distinctive form. Systems are classified according the method of carrying out the process (See single-tree selection, shelterwood cutting, group selection, even age management, uneven age management, and clearcut).
Single-tree Selection	A cutting method to develop and maintain uneven-aged stands by the removal of selected trees from specified age classes over the entire stand area in order to meet a predetermined goal of age distribution and species in the remaining stand.
Slash	The wood residue left on the ground after harvesting, cultural operations, windstorms, fire, or road building. It includes unused logs, uprooted stumps, broken or uprooted stems, tops, branches, and leaves.
Slough	A section of an abandoned river channel containing stagnant water and occurring on a floodplain or delta.
Smolt	A young silvery salmon or trout which moves from freshwater streams to salt water.
Snag	A standing dead tree usually greater than 5 feet in height and 6 inches in diameter at breast height.
Soil drainage	The rapidity and extent of the removal of water from the soil, in relation to additions especially by surface runoff and by flow through the soil to underground spaces.
Soil Resource Inventory	The systematic examination, description, classification, and mapping of soils in an area.
Soil Mass Movement	See mass movement
Somewhat Poorly Drained Soil	Water in the soil is removed from the soil slowly enough to keep it wet for significant periods but not all of the time. Mottling generally occurs deeper than 10 inches from the soil surface.

Special-Use Permit — A permit issued under established laws and regulations to an individual, organization, company, local, state, or federal government agency for occupancy or use of National Forest land for some special purpose. Examples include uses of National Forest System land, improvements and resources except those provided for in Forest Service Regulations for timber, minerals, and livestock.

Stabilization (cultural resources) — The process of arresting the deterioration of a damaged cultural resource in order to prevent further damage from occurring. Stabilization may include reconstructing portions of the cultural resource.

State Historic Preservation Officer — The official appointed or designated pursuant to Section 101(b)(1) of the National Historic Preservation Act of 1966, as amended, to administer the the State Historic Preservation Program.

Stream Biological Production — Includes all levels of productivity: primary, secondary, and higher levels of production. Higher levels of production result from animals consuming secondary or any higher levels of production. For example, fish consuming other fish.

Primary Production — Results from photosynthesis by green plants. In streams includes production from algae and aquatic plants, and from non-stream sources such as leaf litter.

Secondary Production — Results from consumption by animals of materials produced in primary production In streams this includes production of macroinvertebrates and some fish species.

Stream Class — A means to categorize stream channels based on their fish production values. There are three stream classes on the Tongass National Forest. They are:

Class I: — Streams with anadromous (fish ascending from oceans to breed in freshwater) or adfluvial (fish ascending from freshwater lakes to breed in streams) lake and stream fish habitat. Also included is the habitat upstream from migration barriers known to be reasonable enhancement opportunities for anadromous fish and habitat with high value resident sport fish populations.

Class II: — Streams with resident fish populations and generally steep (often 6-15 percent) gradient (can also include streams from 0-5 percent gradient where no anadromous fish occur). These populations have limited sport fisheries values. These streams generally occur upstream of migration barriers or are steep gradient streams with other habitat features that preclude anadromous fish use.

Class III: — Streams with no fish populations but have potential water quality influence on the downstream aquatic habitat.

Stream Order — First order streams are the smallest unbranched tributaries; second order streams are initiated by the confluence of two first order streams; third order streams are initiated by the confluence of two second order streams, and so on.

Substrate — The size of rock in the bed (bottom) of rivers and streams.

Suitable Forest Land — Forest land for which technology is available that will ensure timber production without irreversible resource damage to soils, productivity, or watershed conditions; and for which there is reasonable assurance that such lands can be adequately restocked and for which there is management direction that indicated that timber production is an appropriate use of that area.

Suspended Sediment	The very fine soil particles which remain in suspensions in water for a very considerable period of time without contact with the stream or river channel bottom.

T

Temporary Facility	Any structure or other man-made improvement which can be readily and completely dismantled and removed from the site when the authorized use terminates.
Tentatively Suitable Forest Land	Forest land that is producing or is capable of producing crops of industrial wood and: (a) has not been withdrawn by Congress, the Secretary of Agriculture or the Chief of the Forest Service; (b) existing technology and knowledge is available to ensure timber production without irreversible damage to soils productivity, or watershed conditions; (c) existing technology and knowledge, as reflected in current research and experience, provides reasonable assurance that it is possible to restock adequately within 5 years after final harvest; and (d) adequate information is available to project responses to timber management activities.
Terrestrial ecosystems	Vegetative communities relating to the influence of land (non-wetland) as distinct from those predominantly influenced by water (wetlands).
Thinning	The practice of removing some of the trees in a stand so that the remaining trees will grow faster due to reduced competition for nutrients, water, and sunlight. Thinning may be done at two different stages:
Precommercial Thinning	Removing trees that are too small to make a merchantable product.
Commercial Thinning	Removing trees that have reached sufficient size to be manufactured into a product.
Threatened and Endangered Species	Species identified by the Secretary of the Interior in accordance with the 1973 Endangered Species Act, as amended.
Timber Harvest Schedule	The quantity of timber planned for sale and harvest, by time period, from the area of land covered by the Forest Plan.
Timber Stand Improvement (TSI)	All noncommercial intermediate cuttings and other treatments to improve to improve composition, condition, and volume growth of a timber stand.
Tiering	Refers to the elimination of repetitive discussions of the same issue by incorporating by reference the general discussion in an environmental impact statement of broader scope. For example, a project environmental assessment could be tiered to the Forest Plan EIS.
Total Stream Discharge	Total water outflow from stream or river.

Top Filing	The filing of a future selection application by the State of Alaska, subject to valid existing rights, for lands which are not available for selection on the date of filing. If otherwise valid, these applications become an effective selection, without further action by the state, upon the date included lands become available for selection. Top filings for the State of Alaska are authorized by Section 906(e), ANILCA
Traffic Service Level (TSL)	A description of the significant traffic characteristics and operating conditions of a road. Local roads will normally be "C" or "D"; collectors, "B" or "C"; and arterials, "A" or "B".
Transportation and Utility System (TUS)	Significant corridors, with their associated sites used to accommodate public transportation and energy transmission needs.
Transportation and Utility System Avoidance Area	An area having one or more physical, environmental, institutional, or statutory impediments to system designation. Avoidance areas are generally smaller than exclusion areas can be avoided through s site-specific analysis. (USDA Forest Service, Region 6 memo dated December 2, 1987 from Director of Lands and Minerals to Director of Planning)
Transportation and Utility System Exclusion Area	A large area (large enough to cause significant barriers) which legislatively precludes transportation and utility systems. (USDA Forest Service, Region 6 memo dated December 2, 1987 from Director of Lands and Minerals to Director of Planning)
Transportation and Utility System Window	Usually s hort, narrow passageway through constrained areas which is the most feasible potential location for linear facilities, considering engineering and/or environmental factors. (USDA Forest Service, Region 6 memo dated December 2, 1987 from Director of Lands and Minerals to Director of Planning.
Transportation/Utility Corridor	A linear strip of land identified for the present location of transportation or utility rights-of-way within its boundaries. (USDA Forest Service, Region 6 memo dated December 2, 1987 from Director of Lands and Minerals to Director of Planning)
Trust	A right of property, real or personal, held by one party for the benefit of another (Black, 1979).
Turbidity	An expression of the optical property that causes light to be scattered and absorbed rather than transmitted in straight lines through a water sample; turbidity in water is caused by the presence of suspended matter such as clay, silt, finely divided organic and inorganic matter, plankton, and other microscopic organisms.

U

Unconfined Stream Channels	Streams that due to lack of stream incision, and affects of geomorphic landform characteristics and local geologic conditions results in streams overflowing their banks, changing flows to other channels, and establishing new channels during flood conditions.

Undertaking (cultural resources)	Any project, activity, or program that can result in changes in the character or use of historic properties, if any such properties are located in the area of potential effects. The project, activity, or program must be under the direct or indirect jurisdiction of a Federal Agency or be licensed or assisted by a Federal agency. Undertakings include new and continuing projects, activities, or programs and any of their elements not previously considered under Section 106, National Historic Preservation Act of 1966, as amended.
Uneven-Aged Management	The application of a combination of actions needed to simultaneously maintain continuous high-forest cover, recurring regeneration of desirable species, and the orderly growth and development of trees through a range of diameter or age classes to provide a sustained yield of forest products.
Unsuppressed	A fire that remains unextinguished or unconfined. The spread has not been halted.
Utilization Standards	Standards guiding the use and removal of timber. They are measured in terms of diameter at breast height (DBH) and top of the tree inside the bard (top DIB) and the percentages of "soundness" of the wood.

V

Valid	Having legal strength or force, executed with proper formalities, incapable of being rightfully overthrown or set aside (Black, 1979)
Valley	An elongate, relatively large, externally drained depression of the earth's surface that is primarily developed by stream erosion.
Valley bottom	A generally term for the nearly level to gently sloping part of a valley. Also referred to as the valley floor.
Value Comparison Unit (VCU)	A distinct geographic area that generally encompasses a drainage basin containing one or more large stream systems. Boundaries usually follow easily recognizable watershed divides. These units were established to provide a common set of areas for which resource inventories could be conducted and resource value interpretations made.
Very Poorly Drained Soils	Water is removed from the soil so slowly that the water table remains at or on the surface the greater part of the time. Soils of this drainage class usually occupy level or depressed sites and are frequently ponded.
Viable Population	A population which has adequate numbers and dispersion of reproductive individuals to ensure the continued existence of the species population in the planning area.
Vegetation release	The freeing of a vegetation (grass, forbs, brush, trees) by eliminating the competition for nutrients, water, and sunlight. Once competition for these items has been eliminated, subdued, or stagnated vegetation will display vigor and growth.
Viewshed	An expansive landscape or panoramic vista seen from a road, marine water way or specific viewpoint.

Visual Absorption Capability (VAC)	The ability of the landscape to absorb management activities Landscapes are rated with high, moderate or low abilities to absorb management activities. These ratings reflect the degree of landscape variety in an area, viewing distance and topographic characteristics. As an example, steep, evenly sloped landscapes viewed in the foreground to middleground are typically given a low VAC rating.
Visual Quality Objective (VQO)	A desired level of scenic quality and diversity of natural features based on physical and sociological characteristics of an area. Refers to the degree of acceptable alterations of the characteristic landscape.
Preservation	Management activities are generally not allowed in this setting. The landscape is allowed to evolve naturally.
Retention	Management activities are not evident to the casual Forest visitor.
Partial Retention	Management activities may be evident, but must remain subordinate to the characteristic landscape.
Modification	Management activities may dominate the characteristic landscape but must, at the same time, use naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed as middleground (1/4 to 5 miles from viewer).
Maximum Modification	Management activities may dominate the characteristic landscape, but should appear as a natural occurrence when viewed as background.

W

Watershed	Portion of the forest in which all surface water drains to a common point. Watersheds can range from a few tens of acres that drain a single small intermittent stream to many thousands of acres for a stream that drain hundreds of connected intermittent and perennial streams.
Water Table	The upper surface of the ground water or that level below which the soil is saturated with water.
Well Drained Soils	Water is removed from the soil readily, but not rapidly. These soils are free of mottlings.
Wetlands	Those areas that are inundated by surface or ground water with a frequency sufficient, under normal circumstances, to support a prevalence of vegetative or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include muskegs, marshes, bogs, sloughs, potholes, river overflows, mud flats, wet meadows, seeps, and springs.
Wildfire	Any wildland fire not designated and managed as a prescribed fire within an approved prescription. All wildfires will be given an appropriate suppression action.

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